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Follow-up Community Noise Survey of Noise Barriers at Warfield ANG, Baltimore MD

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March 1990

Final Report

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This report is a follow-up report to USAFOEHL Report 87-164EH0141LNA, and presents documentation on the effectiveness of the two barrier design installed at Warfield ANG to control community noise complaints from unsuppressed TF34-GE-100A engine run-ups. Measurements indicate the barriers are working as designed and provide a 7 decible overall noiose reduction at the complainant's property.

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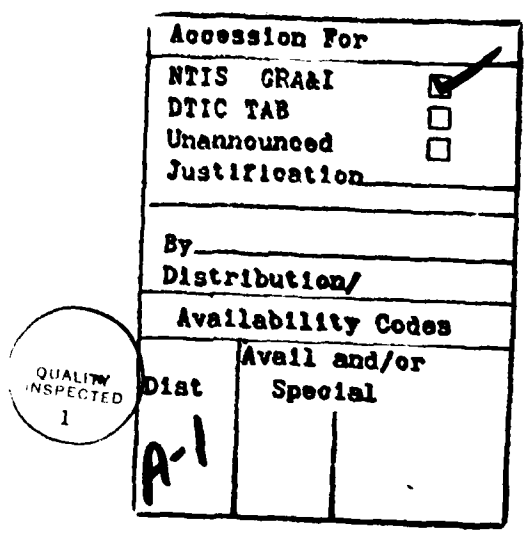

Contents

I. INTRODUCTION

A. Purpose: This report provides results of noise data collected during a follow-up survey at Warfield ANG MD, during unsuppressed TF34-GE-100A engine run-ups at the A-10 Test Cell, 25-30 June 1989.

B. Problem: As the result of complaints from the civilian community, the Warfield ANGB bioenvironmental engineering service requested AFOEHL perform a noise study. The initial survey was performed during the period of 22-26 June 1987. AFOEHL produced a report (USAFOEHL Report 87-164EH0441LNA, Noise Assessment of Unsuppressed TF34-GE-100A Engine at Warfield ANG, Baltimore MD) recommending a noise barrier design as an interim solution and, as a long-term solution, installation of a noise suppressor. In response to community involvement, the Maryland ANG has built the noise barriers. They requested a follow-up survey be accomplished to evaluate the effectiveness of the noise barriers.

C. Scope: This report provides the results of a follow-up survey of community noise and the effectiveness of the noise barriers. It also recommends modifications to the interim noise barriers and continued effort for justification of a noise suppressor.

II. FINDINGS

A. Methodology: A visual inspection of the noise barriers was performed and the following noise measurements were made: far-field noise measurements on a 100 meter circle around the unsuppressed TF34-GE-100A engine; average day-night sound levels (DNL or Ldn) and exceedance levels measured at five primary sites as shown in Figure A.1 of Appendix A; and the far-field noise measurements at the complainant's property line. Pictures of barriers and some sites are located in Appendix A. Meteorological data were taken throughout the entire survey. The weather was within acceptable limits for obtaining accurate measurements. See Appendix J for definition of terms.

B. Physical Inspection: Our inspection on 26 Jun 89 revealed the noise barriers were not properly designed or positioned (See Appendix A). Each barrier was constructed by stacking four overseas shipping containers two high and two side by side. The bottom two are being used for storage. The gaps between each container on the noise source side of each barrier were covered with thin sheet metal. The mass density of the containers themselves did not appear to be great enough to provide the appropriate sound transmission loss. The metal material construction of the shipping containers is not the most appropriate material for use as a noise barrier. The metal vibrates from both the impact of the engine exhaust gases and the airborne acoustic energy from the engine. This causes sound energy to resonate from the backside surface area of the barrier. The noise barriers were not positioned perpendicular to a line drawn from the noise source (engine) to the receiver (complainant's property). Also, the barrier designed to help protect Air Force workers in the KO building was not positioned to block the noise. In addition, the noise environment around the test cell has changed because several other containers used for storage were placed near the test cell pad creating noise reflections and unknown noise paths.

C. Barrier Noise Reduction: Tests of the engine run-ups at the complainant's property on the afternoon of 27 June 89 and evening of 28 June 89 showed a noise reduction. On 27 June 89, measurements were taken under the same ideal conditions used for the 1987 survey. Analysis of the data at the complainant's property showed the barrier provided an overall 7 decibel A-weighted sound level [dB(A)] reduction between the 1987 data of 61 dB(A) and the 1989 data of 54 dB(A) (See Table 1). A pure tone signal centered at a one-third octave band frequency of 3150 Hertz was audible. On 28 June 89, more data were taken with the non-ideal conditions of winds gusting up to 8 knots and blowing straight at the complainant's property. This time the overall noise levels were 2 dB(A) higher than the 1987 ideal condition measurements (63.3 versus 61.0). For more 1987 versus 1989 data and barrier transmission loss, see Appendix B.

D. 100 Meter Circle Measurements: Far-field noise data from the unsuppressed TF34-GE-100A engine were collected at a radius of 100 meters at several points on the circle centered on the engine exhaust outlet. The zero degree angle was located in the engine intake direction, as it was in 1987. The far-field data were collected at three points 30, 270 and 340 degrees and compared against the 1987 data. The noise measurements were made at times when air traffic noise was minimal. The noise data around the circle were collected on audio tape in 35 second segments by portable tape recording systems. The tapes were later analyzed at AFOEHL. The microphone of the system, attached to a hand-held pole, was pointed at the source (zero degree angle of incidence) and vertically scanned from 0.5 to 3 meters for approximately a 35 second period during data acquisition at each measurement location to eliminate anomalies typically encountered when using a fixed microphone location. These recorded noise data samples were then time-integrated on a one-third octave band digital frequency analyzer to derive a root-mean-square sound pressure level. The results which list Overall Sound Pressure Levels (OASPL) and Overall Sound Levels A-weighted (OASLA) values were determined by one-third octave band analysis of the recorded data for the frequency range 10 to 10,000 Hertz (Hz) and are reported in Appendix C.

1. Several other containers besides the ones being used for the noise barriers were added near the run-up site. Because of these barriers, the measurement at 30 degrees was made at 98 meters distance instead of 100 meters. Background noise data were only collected at the 90 degree position. There is no apparent difference in background level between the 1987 and 1989 data (See Table 2).

2. Table 2 is the data summary of the 1987 versus 1989 noise measurements taken around the circle. The OASPL and OASLA values are presented as a function of the measurement location and power setting of the TF34-GE-100A engine.

TABLE 1: 1987 Versus 1989 Sound Levels (dB, A-weighted) at Conrad's Property with Barrier

OCTAVE FREQUENCY BAND, (HZ)									
31.5	63	125	250	500	1000	2000	4000	8000	OVERALL
1987 Background Noise Levels at Conrad's Location									
18.9	34.7	43.6	40.1	36.7	35.1	40.2	32.8	23.6	47.5
1989 Background Noise Levels at Conrad's Location									
17.7	36.7	44.0	44.5	41.9	40.0	37.2	34.5	31.9	49.7
1987 Noise Levels measured at Conrad's Location									
39.7	53.3	58.8	50.8	46.2	47.7	44.7	44.6	34.5	61.0
1989 Measured Noise Levels at Conrad's with barrier in place									
34.0	44.8	49.2	45.8	44.1	44.6	42.5	44.1	34.6	54.0
1989 Measured Levels at Conrad's with wind and barrier in place									
36.4	49.5	57.0	57.1	53.9	54.7	52.3	54.8	35.1	63.3
Theoretical Noise Levels at Conrad's with barrier in place									
33.6	45.7	49.7	40.2	33.3	32.5	28.0	27.1	16.3	51.7
Practical Noise Levels with barrier and 1987 and 1989 backgrounds									
33.6	45.7	49.7	44.5	41.9	40.0	40.2	34.5	31.9	52.8
1987 Theoretical Noise Reduction of Barrier at Conrad's									
5.7	7.6	9.1	6.3	4.3	7.7	4.5	10.1	2.6	
1989 Measured Noise Reduction of Barrier at Conrad's									
6.1	8.5	9.6	5.0	2.1	3.1	2.2	0.5	-0.1	
1987 Recommended STL of Barrier to achieve noise reduction									
16.1	17.6	19.1	20.6	22.9	25.2	26.7	27.5	28.2	

TABLE 2: Noise Level Versus Angle for the TF34-GE-100A Engine.

YEAR	ANGLE (degree)	DISTANCE (m)	BACKGROUND OASPL dB	BACKGROUND OASLA dB(A)	96% RPM OASPL dB	96% RPM OASLA dB(A)
1987	90	100	69.1	43.3	98.1	97.4
1989	90	100	61.7	42.5		
1987	30	100	68.4	44.6	99.0	99.6
1989	30	98			98.4	98.4
1987	270	100	62.5	40.3	93.0	89.4
1989	270	100			92.7	91.5
1987	340	100	65.9	43.5	91.5	91.3
1989	340	100			98.2	89.0

* NOTE: Only acceptable measurement locations are shown. Distances are reference to the engine exhaust. Angles are reference to the engine intake.

E. Day-night Levels: The Average Day-night Sound Level (DNL or Ldn) and four exceedance levels of the five major sites of interest reported in 1987 were measured. These sites represent locations which are in the direction of, or close to, where people work or rest. Site 1 was located at Building 5045, known as the KO building, where maintenance personnel work. Site 2 was located on Mr Conrad's property where some of the complaints were coming from. Site 3 (Lynbrook Road) was located on Air Force property close to adjacent civilian property. Site 4 (POL Area) was located in the direction of the maintenance hangar. Site 5 (Wilson Point Road) was located in the direction of the fire station and residental area. Figure A.1 of Appendix A depicts the site locations. We used a Larson-Davis Model 700 and Metrosonics db-310 noise dosimeter at each site to measure the DNL and the four exceedance levels [Ln(x)]. Three 24-hour periods were recorded. The dosimeters' microphones were placed in approximately the same place as during the 1987 survey, attached approximately 1.75 meters above the ground to poles, fences and trees. In order to calculate a DNL, a doubling rate of three decibels (dB) was used. Ten decibels was added to each hourly average sound level (Lavg) from 2200 to 0700. Each dosimeter calculated an intrusive noise level and a median noise level. An intrusive noise level, Ln(10), is an average level occurring 10% of the time, and a median noise level, Ln(50), occurs 50% of the time. The intrusive level, Ln(10) is the noise level many people perceive as intruding in their lives and the median noise level, Ln(50), is the average noise level to which people are exposed. Appendix D lists the Lavgs for each hour of the DNL data and the four exceedance levels. The Lavgs shown do not include the 10 dB added for the 2200 to 0700 time period to compute DNL. The file name on the data presented in Appendix D determines the site and day of collection (i.e., Data from: P1-0626L means P1 = Site 1, 0626 = Jun 26, and L is Larson-Davis). Table 3 is a summary of all the DNL and intrusive data collected in 1989 at the five sites.

TABLE 3: Summary of Noise Dosimetry Data Including DNL

DATE:	6/26/89	6/27/89	6/28/89
Site	Lavg	Lavg	Lavg
1 (KO Bldg)	65.7	77.6	
2 (Conrad's)		57.9	59.7
3 (Lynbrook)	56		66.1
4 (POL)	60	66.2	64.1
5 (Wilson Point)		56.1	58.3
Site	DNL	DNL	DNL
1 (KO Bldg)	69.4	77.5	
2 (Conrad's)		60.7	64.3
3 (Lynbrook)	63.3		66.5
4 (POL)	66.1	71.6	66.0
5 (Wilson Point)		59.4	61.9
Site	L10	L10	L10
1 (KO Bldg)	61	67	
2 (Conrad's)		59.5	60.5
3 (Lynbrook)	53.5		59
4 (POL)	56	64.5	66.5
5 (Wilson Point)		53.5	58.5
Site	L50	L50	L50
1 (KO Bldg)	47	47	
2 (Conrad's)		49	49
3 (Lynbrook	47		49.5
4 (POL)	45.5	49.5	50.5
5 (Wilson Point)		44.5	48
Site	L90	L90	L90
1 (KO Bldg)	42.5	41.5	
2 (Conrad's)		39.5	41
3 (Lynbrook)	41		42
4 (POL)	40.5	41	42.5
5 (Wilson Point)		39.5	43.5

F. Site Locations: Noise measurements were also made at the sites while the engine was running. These data were recorded exactly the same way as the data recorded around the 100 meter circle. These data provided the actual noise levels near areas/directions of work or rest during engine operation. Table 4 reports the OASPL and OASLA at sites 1, 2 and 3. The results of the one-third octave band analysis for the sites are reported in Appendix E in graphical and tabular form.

TABLE 4: Overall Sound Pressure Level (OASPL) and Overall Sound Level, A-Weighted, (OASLA) Versus Site Locations from TF34-GE-100A engine.

			BACKGROUND		96% RPM	
	Site	Distance (m) from engine	OASPL dB	OASLA dB(A)	OASPL dB	OASLA dB(A)
1987	Bldg 5045	125	65.6	59.9	87.3	82.5
1989	Bldg 5045	125			94.5	93.4
1987	Conrad's	735	67.3	47.5	82.8	61.1
1989	Conrad's	735	65.4	49.7	75.6	54.1
1987	Lynbrook	455	64.2	48.0	71.4	56.0
1989	Lynbrook	455			76.5	65.6

G. Other Sources of Noise: While collecting data at the complainant's property, other sources of noise where perceived as louder than the engine noise source when it was running. It was decided to collect noise recordings on these other noise sources when the engine was not running. Table 5 is a summary of the data collected. All measurements taken of motorized boats exceeded the noise levels generated by the engine run-ups, even under non-ideal conditions by 5 dB(A). Even the sound of the waves slapping on the shore generated from boat wakes exceeded the noise levels generated by the engine run-ups under ideal conditions. Noise levels related to aircraft takeoffs, landings, and flybys exceeded ideal conditions and some exceeded non-ideal conditions. Appendix F presents the results of the one-third octave band analysis for the other noise sources in both graphical and tabular form.

TABLE 5: Overall Sound Pressure Level (OASPL) and Overall Sound Level, A-Weighted, (OASLA) Versus Other Noise Sources as Measured at Site 2, Conrad's Property

Other Sources	OASPL dB	OASLA dB(A)
Boat Passing Near Shore	84.8	70.2
Speed Boat #1	82.3	73.2
Speed Boat #2	87.3	71.2
Two A-10 Takeoff	76.0	69.6
Prop Aircraft Takeoff	77.2	61.9
Single Prop Takeoff	75.7	59.4
Private Jet Takeoff	73.3	60.2
Jet Takeoff	96.5	85.7
Helicopter Flyby	70.7	60.2
Waves Against Shore	62.1	56.4

H. Helicopter: As a side benefit, noise levels were taken inside a Maryland State Police DAUPHIN II helicopter, HR 36 SA 365N1. The interior noise measurements were taken using a Bruel and Kjaer sound level meter set at SLOW, RMS, and RANDOM. Noise levels were measured in the copilot position. See Appendix G.

III. NOISE CONTROL

A. Noise Barrier: Even though the noise barriers were not oriented exactly right and were made of metal (See Appendix A), the noise barrier designed to reduce TF34-GE-100A run-up noise at the Conrad property appears to be working exactly as predicted at low frequency. Small differences in barrier orientation usually do not have a significant impact on noise reduction, and this holds true in this case. What is surprising is the barriers are working at low frequency, which is contrary to barrier reduction theory where high frequency is easier to attenuate (See Table 1). Low frequency sound has a tendency to wrap around barriers; but, this does not appear to be happening in this case (See Appendix B). The noise levels taken in the gap between the A-10 and C-130 barriers showed no signs of this gap being an alternate path for noise propagation. Also, noise levels taken when an 8 knot wind was blowing straight at the Conrad's property were 9 dB(A) higher than with calm winds. The recurrence of this wind condition is not addressed.

B. Noise Suppressor: The long term solution to noise from engine operation is a noise suppressor. A noise suppressor should reduce the overall A-weighted noise levels at Conrad's to at least those measured with ideal conditions and the barriers in place. Also, the pure-tone at 3150 Hz should almost be eliminated as far as perception is concerned. However, this does not mean the people on Conrad's property will not hear or feel noise

propagating from the noise suppressor. Noise suppressors take advantage of the fact that low frequency energy is not heard and is less likely to cause a hearing annoyance at the same noise level. However, there is a possibility of nearby building vibration created by the low frequency output of noise suppressors. Noise levels from this source measured at the five sites is also dependent on atmospheric conditions. Just like with the noise barriers, noise levels are going to be higher on days when the wind is blowing hard towards Conrad's property than when other atmospheric conditions exist. The greatest advantage to the noise suppressor is noise levels will be reduced 360 degrees around the engine whereas noise levels are reduced on the receiver side of the noise barriers but increase on the source side due to reflections. In other words, a noise suppressor would not only reduce levels at Conrad's property, but also at the KO building, POL area, and on the other side of the airport. This would reduce the potential for hearing loss for the people working in the KO building, test cell personnel and passers-by. It should be noted, due to the low frequency energy components generated from noise suppressors, the engine run-ups may need to be sited somewhere else. The KO building may not be able to withstand the possible low frequency induced vibration from the noise suppressor. Therefore, siting considerations should be well thought out and in accordance with T.O. 00-25-237 before building a noise suppressor. Another useful document for site planning is the HQ AFLC/DEP "Hush House Site Planning Bulletin," 1 October 1987.

IV. DISCUSSION

A. The noise contribution by the engine run-ups on the overall community noise cannot be evaluated using the DNL values shown in Table 3. There is too much variance in the data. Airport and other noises cannot be separated. The Lavgs used to calculate the DNLs (Appendix D) show no correlation between noise levels and site locations.

B. The intrusive noise level, Ln(10), shown in Table 3, is the noise level that people perceive as intruding in their lives. This is not always true. The Ln(10) for Mr Conrad's property is approximately 60 dB(A) versus 59 dB(A) in 1987. The OASLA has changed from 61.1 dB(A) to 54.1 dB(A) at Mr Conrad's when the engine is running at 96% rpm. Under ideal conditions, the noise from the engine is less than the intrusive level and should not be intrusive.

C. In 1987, we recommended the barrier be designed so the A-weighted noise levels at the receiver would not exceed 55 dB(A). At the Conrad property line, the barrier would have to provide a minimum of 6 dB(A) reduction from 61 dB(A) to 55 dB(A). However, the barrier was deliberately designed to provide 3 dB(A) more reduction, or a 9 dB(A) attenuation from 61 dB(A) to 52 dB(A). The additional 3 dB(A) would compensate for any error. The 1989 noise barrier provided a noise reduction of 7 dB(A) from 61 dB(A) in 1987 to 54.1 dB(A). Since 54.1 dB(A) does not exceed 55 dB(A), the barrier is within recommended design goals. If required, the 54.1 dB(A) noise level would meet the Maryland maximum allowable residental nighttime level of 55 dB(A) and is almost 11 dB(A) below the maximum daytime level of 65 dB(A). Even under non-ideal conditions, the noise level is 63.3 dB(A),

which is less than the maximum allowable daytime level. We could not determine which barrier contributes the greatest noise reduction at Conrad's. High frequency energy is still reaching the Conrad property. The most likely reason is the TF34-GE-100A barrier is vibrating due to backwash from the engine and high frequency radiation is occurring. Stiffening and/or damping on the face surfaces of the barriers will help eliminate vibrations and high frequency energy at Conrad's. These noise levels were measured at worst case or highest noise levels, operating the engines at 96% rpm; but this testing usually does not last for long periods of time. No information was collected to determine the amount of time the engine is run at this condition, but it would be expected to be less than ten percent of the total engine run time. So the impact from the engine run-ups should be less.

D. The second barrier at the C-130 engine test pad, designed to reduce levels at the KO building is not working as planned. This is because the barrier is not located in the path of the noise from the TF34-GE-100A or the C-130 run-up area to the KO building. However, moving it now could possibly affect the results of the noise reduction at Conrad's. Fixing the noise barrier by filling in gaps with noise attenuating material and adding sound absorption material to the outside of the barrier facing the engines should provide the appropriate sound transmission loss to provide the desired barrier attenuation.

E. Table 5 lists some of the many other noise sources surrounding Warfield ANGB which generate the same or greater acoustical A-weighted energy as the engine run-ups. However, they do not appear to have generated the same amount of complaints. The noise sources associated with aircraft takeoffs, landings and flyovers are usually of short duration and produces only momentary, if any, perceived acoustical impacts. If this momentary impact is frequently repeated, it may have a tendency to be perceived as normal and therefore be accepted instead of being perceived as an acoustical problem. The noise levels generated by boats of all sorts in our measurements at Conrad's Property (Site 2) were higher than the engine run-up noise measured under non-ideal conditions. One reason the engine run-ups may be perceived as negative is they operate for longer periods of time at a constant noise level, whereas boats and aircraft vary in noise levels and usually do not last long. A second reason could be the engine run-ups are a relatively new noise source in the noise environment. One of the main reasons why people perceive some noise as a negative acoustical impact while others do not is their socioeconomic background. For example, if someone is on the bank fishing, they may not like "loud" boats going by; but if the person in the boat owns or is renting it, the noise does not seem to bother them. Also, the same noise easily attenuated by housing, but perceived as negative by a person who is a nature-lover and has a tendency to stay outdoors, may not be offensive to a home dweller.

F. Another major contributor in the perception of noise being annoying is the frequency spectrum of noise. A great deal of research has been done on this subject, and A-weighting has been determined to be the best measure for determining potential hearing damage or annoyance. In fact, almost all regulations and laws use A-weighted sound levels. A-weighting was used in this survey and the short comings associated with it may be one of the causes

of complaints. For example, even though there was a significant A-weighted noise reduction at Conrad's, a pure tone of 3150 Hz was heard. Depending on socioeconomic conditions, this pure tone could cause differing reactions. However, the frequency spectrum of the noise at Conrad's, even in an outdoor setting, would not likely cause hearing loss or create speech communication problems. Also, the impact of these noise levels would be expected to be even less indoors because of the attenuation of the house. The noise probably would not even be heard, especially if the TV or radio is on. The noise barrier was chosen as an interim solution to the problem; and, under the right atmospheric conditions, works extremely well.

G. Because most of the complaints about noise are being generated at Conrad's property during TF34-GE-100A engine run-ups, the main focus of this report is on the noise levels at Conrad's. However, there is some concern over the noise exposure of maintenance personnel in the KO Building and test cell personnel. Hearing protection or feasible engineering controls are required for personnel exposures greater than 84 dB(A), and noise levels inside the KO building are close to 84 dB(A) with the doors open. Outside the building, the noise levels are at least 94 dB(A) (See Appendix H). The second barrier was designed to lower the noise exposures at the KO building. However, the barrier was not erected in the appropriate place to block the noise path between the KO building and the TF34-GE-100A engine run-up area. In addition, a shorter barrier/container was placed at the end of this barrier, changing the original barrier design and voiding the simple prediction method used to estimate the barrier noise reduction at the KO building. As stated in the previous report, any change in the noise environment either in barrier design or weather conditions can have significant impact on noise levels. No measurements were taken during C-130 run-ups in 1987 or 1989 because the noise generated from this test stand was not perceived to be causing a problem.

V. CONCLUSIONS

A. On the basis of A-weighted sound levels, the barriers are working as designed. However, due to the frequency spectrum and socioeconomic differences, some individuals are still complaining.

B. The day-night sound levels (DNLs) measured during the survey all exceeded 55 dB(A); however, only three days were measured. DNLs themselves are not the cause of the complaints. In addition, the engine run-ups do not appear to be a major contributor to these noise levels.

C. The noise energy generated by the test cell is being channeled by the wind. Weather conditions are always going to affect the results of a noise reduction effort, whether it is a noise barrier or a noise suppressor. However, a noise suppressor will provide 360 degrees of noise reduction and probably more reduction than is being provided by the noise barriers.

D. The noise environment around the test cell pad has changed because of the addition of storage containers.

E. KO building personnel and test cell personnel are being exposed to hazardous noise when working outside in the vicinity of the KO building or the test cell.

F. The installation of the two barriers provides the best interim solution until a permanent noise suppressor can be built. However, neither will completely eliminate complaints generated due to socioeconomic effects.

VI. RECOMMENDATIONS

A. Long Term

1. Continue to pursue installation of a noise suppressor.

2. Fix both the noise barriers by filling in gaps with noise attenuating material and add sound absorption material to the outside of the barriers facing the engines. Stiffening and/or damping must be accomplished on the face surfaces of the barriers to eliminate vibrations. Appendix I lists some of the ways to accomplish this.

3. Conduct noise dosimetry on KO building personnel and test cell personnel. Provide appropiate hearing protection and administrative controls if necessary. Determine if personnel should be on the audiometric monitoring program.

4. Stack another container on top of the red container at the end of the C-130 engine noise barrier, or move the red container and place two other containers like the ones used for the noise barriers. Ensure the containers are prepared the same as the fixed noise barriers and all cracks between containers are appropriately sealed.

B. Short Term

1. Restrict the operation of the test cell to times when the wind is not blowing in the direction of Mr Conrad's property. Winds up to about 4 to 6 knots may be tolerable in this direction.

2. Continue to maintain the log of complaints already started. Correlate this log with wind speed and direction to relax or tighten the weather restriction as appropriate.

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5. Carrol, Michael M. "Introduction to Noise and Acoustic Terminology." Community Noise Control: Prediction, Measurement, and Regulation, A two day conference/Dec 2-3, 1976/San Francisco CA, Continuing Education in Engineering, University Extension, and The College of Engineering, University of California, Berkeley (Dec 1976)

6. Johnson, Daniel L., "Highlights of the Guidelines for Environmental Impact Statements with Respect to Noise." Aerospace Medical Research Laboratory Technical Report No. AMRL-TR-78-14 (Dec 1979)

7. "Hush House Site Planning Bulletin." HQ AFLC/DEP and HQ USAF/LEEVX (1 October 1987)

8. Thuman, Albert and Richard K. Miller, Fundamentals of Noise Control Engineering. New Jersey: Prentice-Hall (1986)

9. T.O. 00-25-237, "Procedures for Identifying and Justifying Base Requirements for Aircraft Turbine Engine Ground Run-up Noise Suppressors" (30 Sep 89)

10. U.S. Department of Housing and Urban Development, Washington DC, Office of Policy Development and Research, "Technical Background for Noise Assessment Guidelines," pp. III-48-55, HUD0002272 (Jan 1980)

11. U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." EPA Report No. 550/9-74-004 (Mar 1974)

APPENDIX A

Pictures of Barriers and Locations

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FIGURE A.1: ENGINE TEST STAND AND COMPLAINANT'S PROPERTY

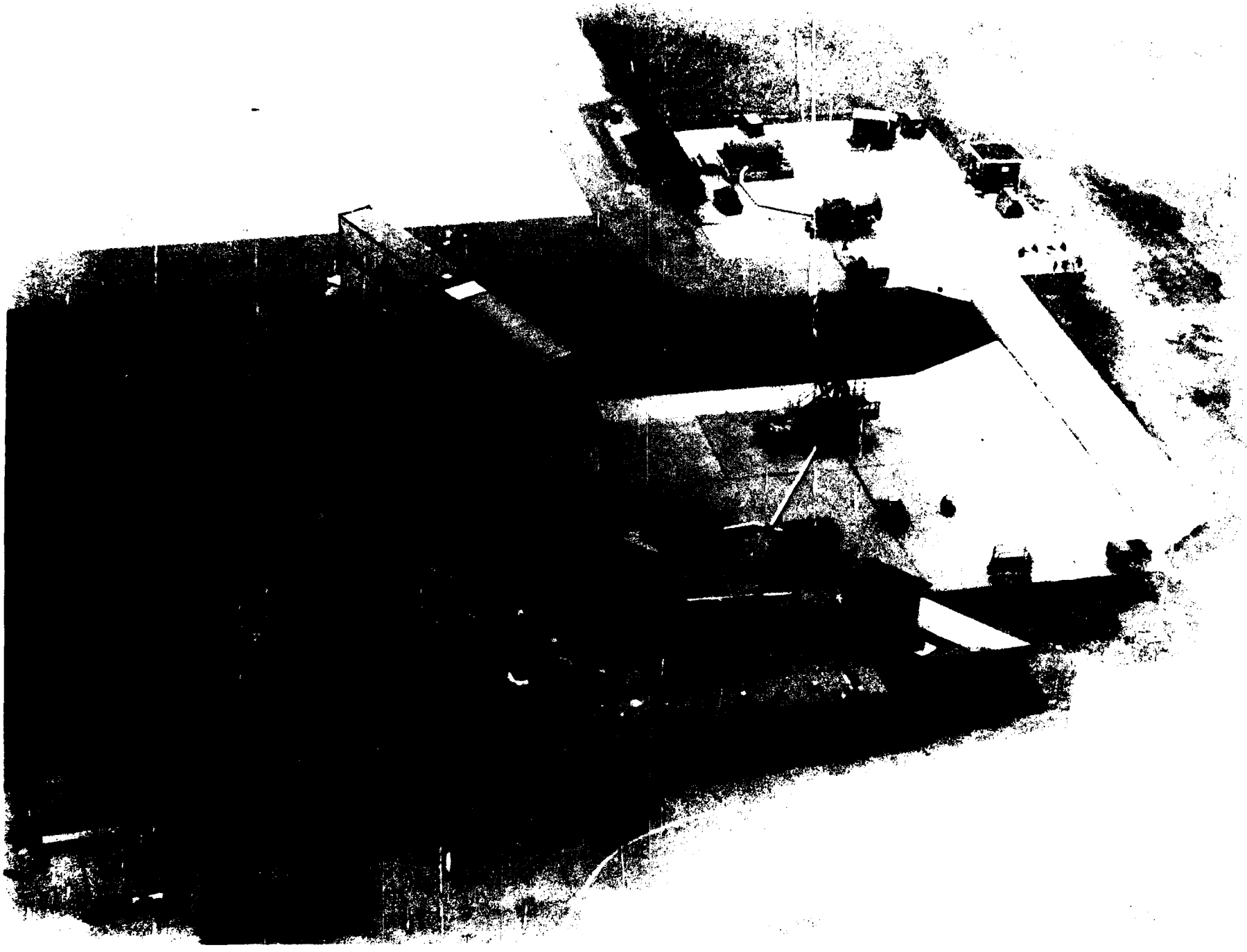

FIGURE A.2: ENGINE TEST STAND AND BARRIERS

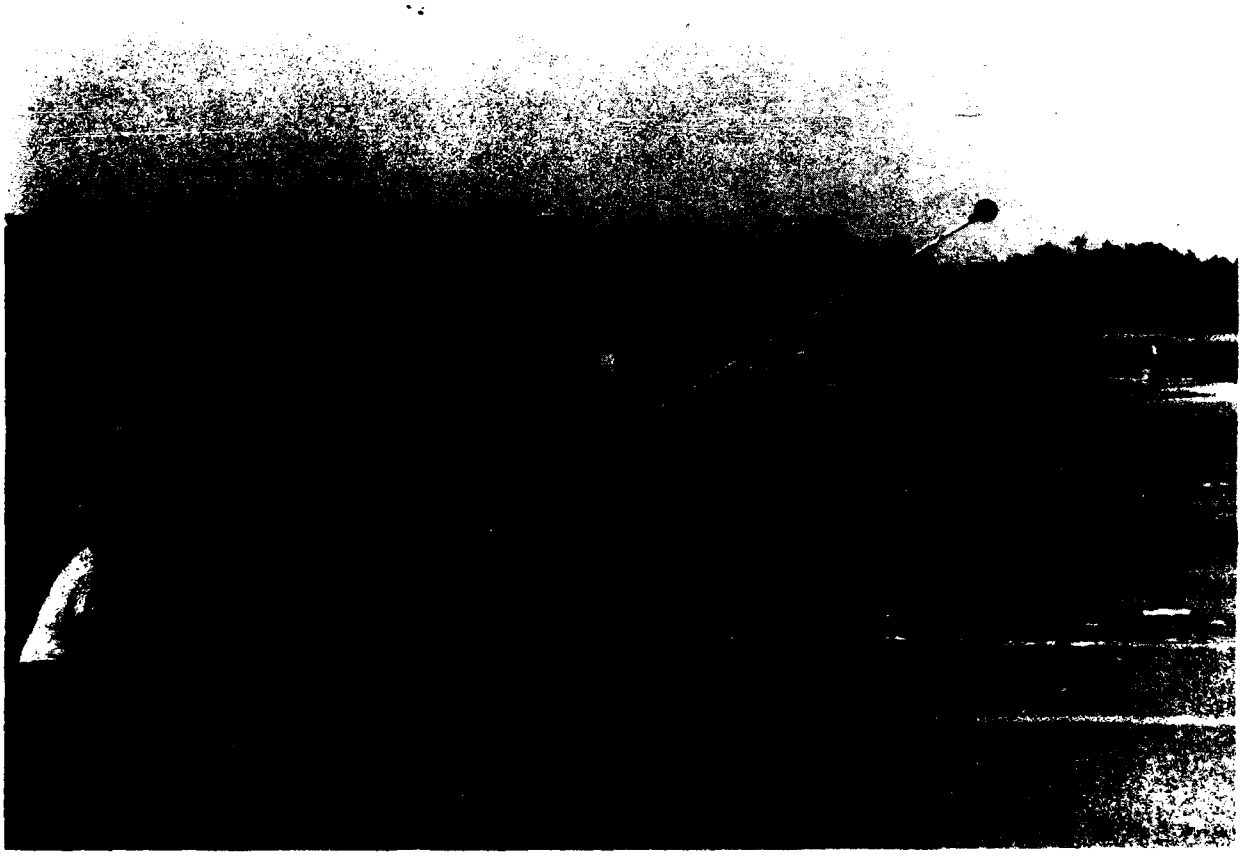

FIGURE A.3: 270 DEGREE POINT

FIGURE A.4: SITE 2, CONRAD'S

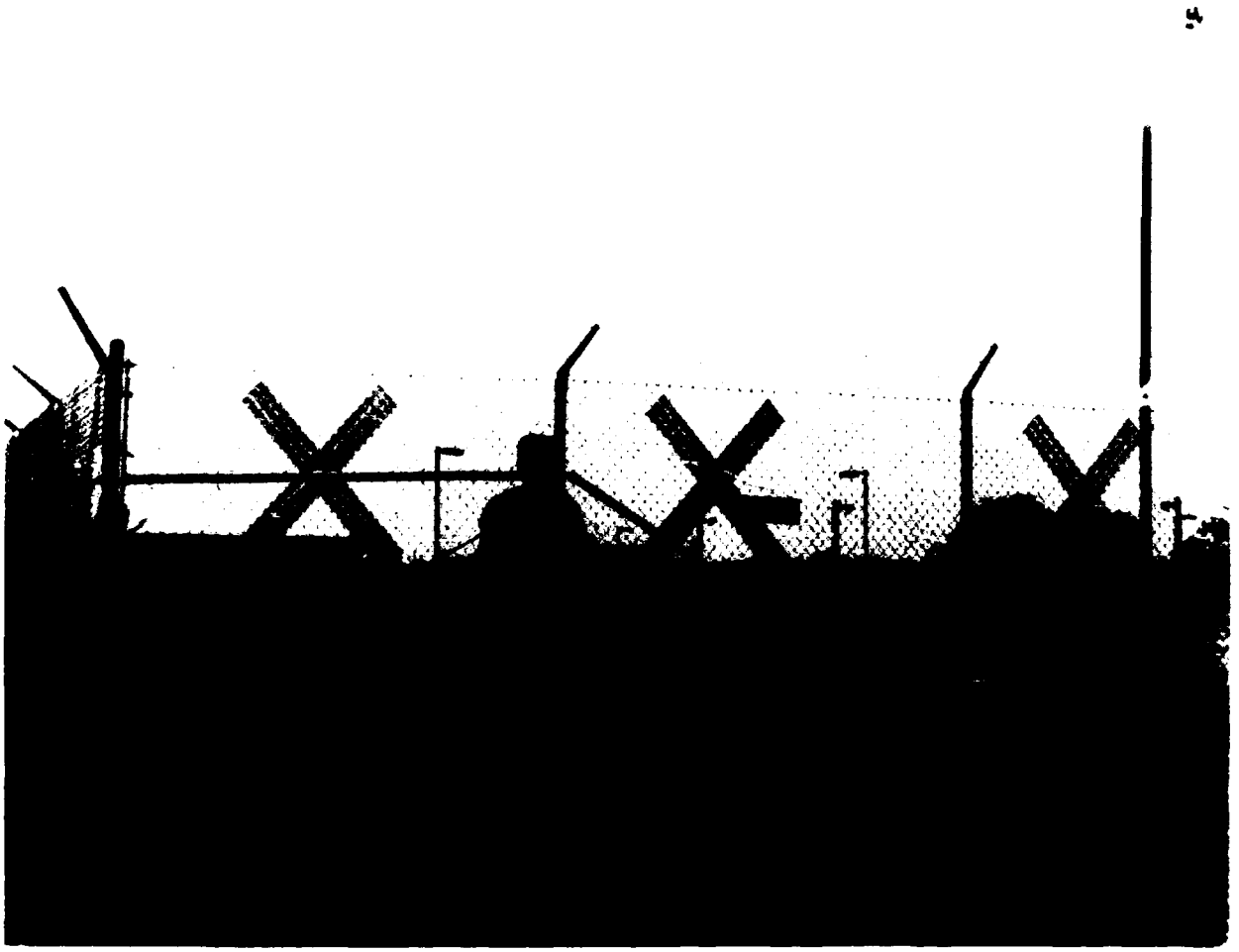

FIGURE A.5: SITE 4, POL

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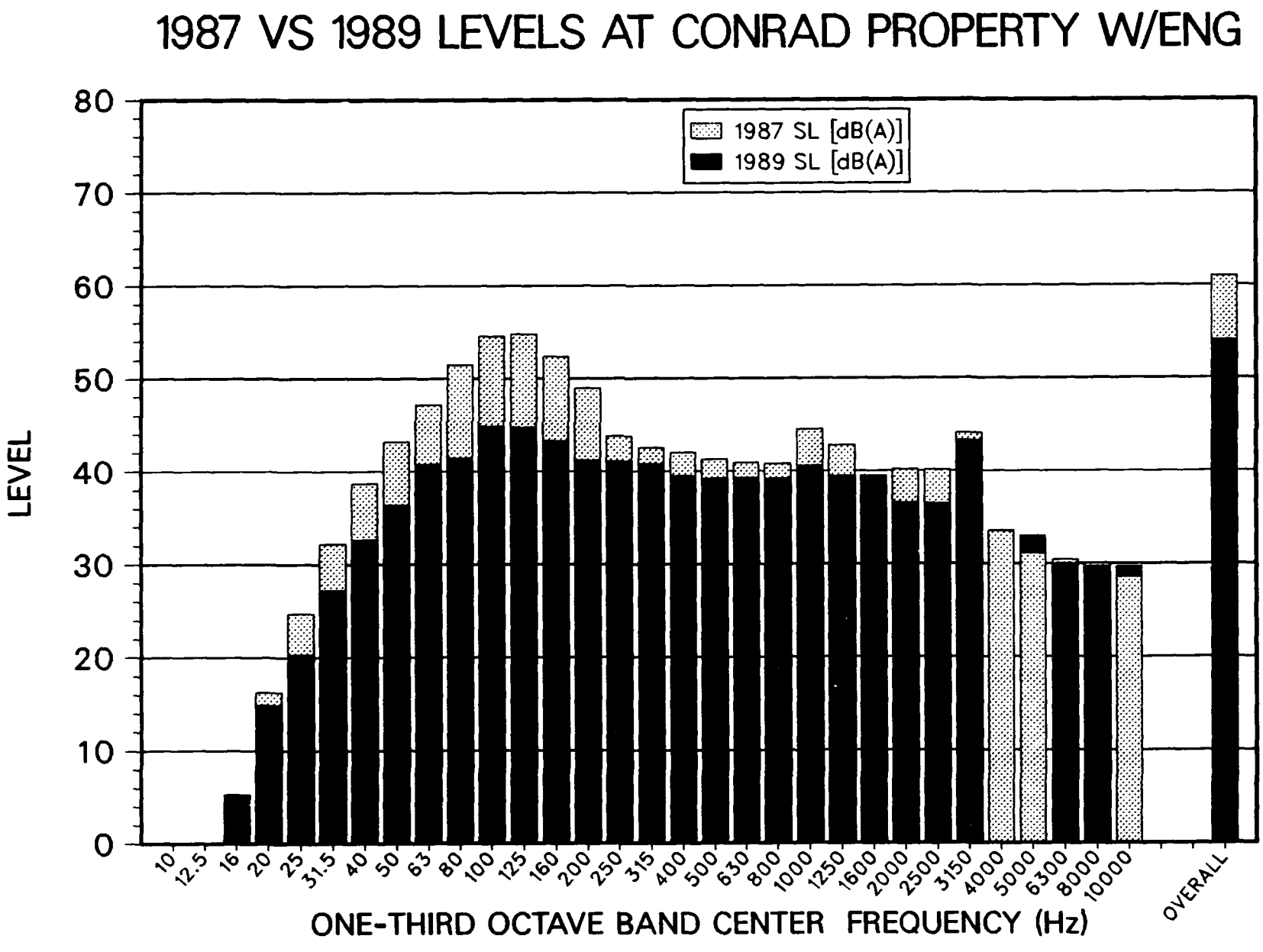
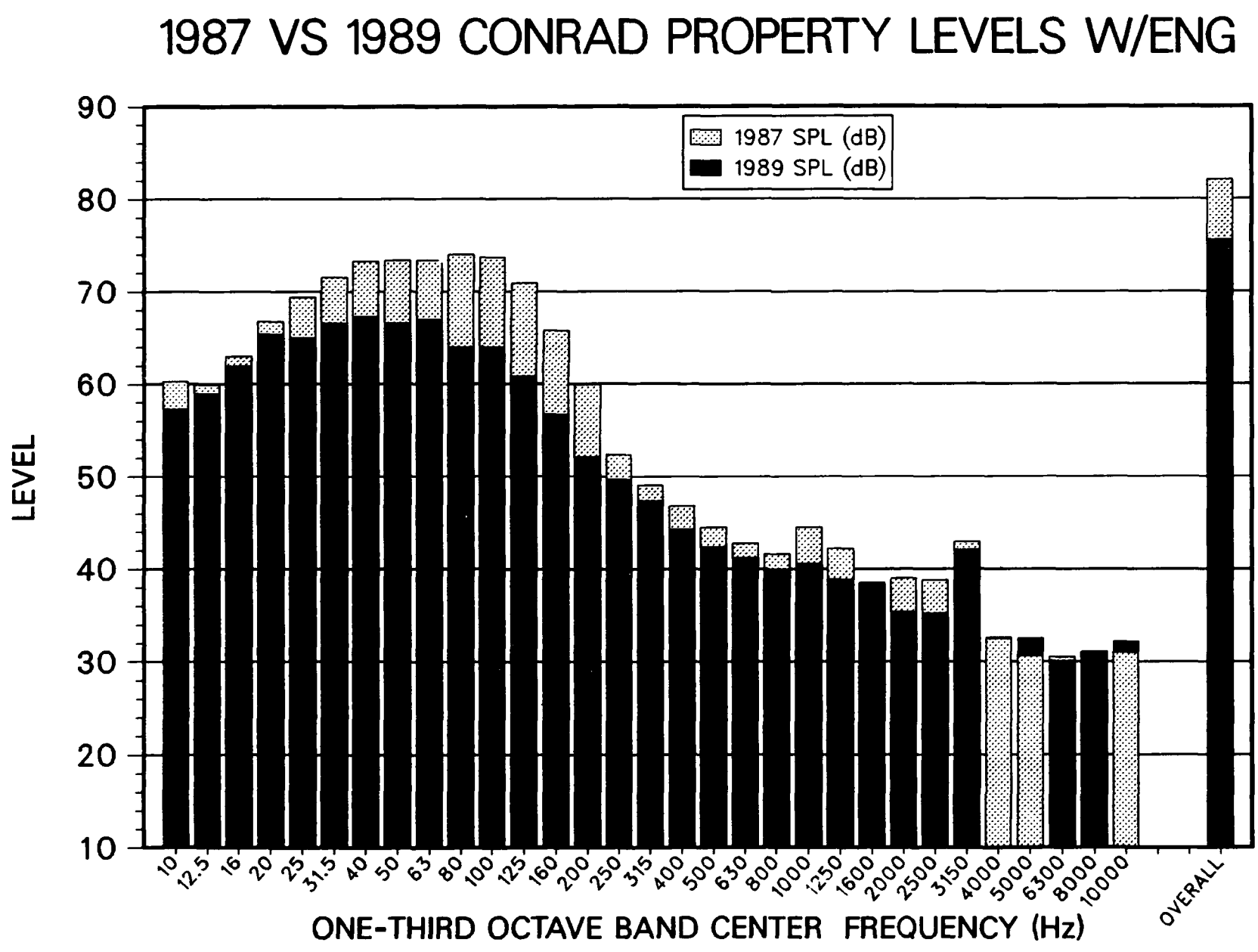
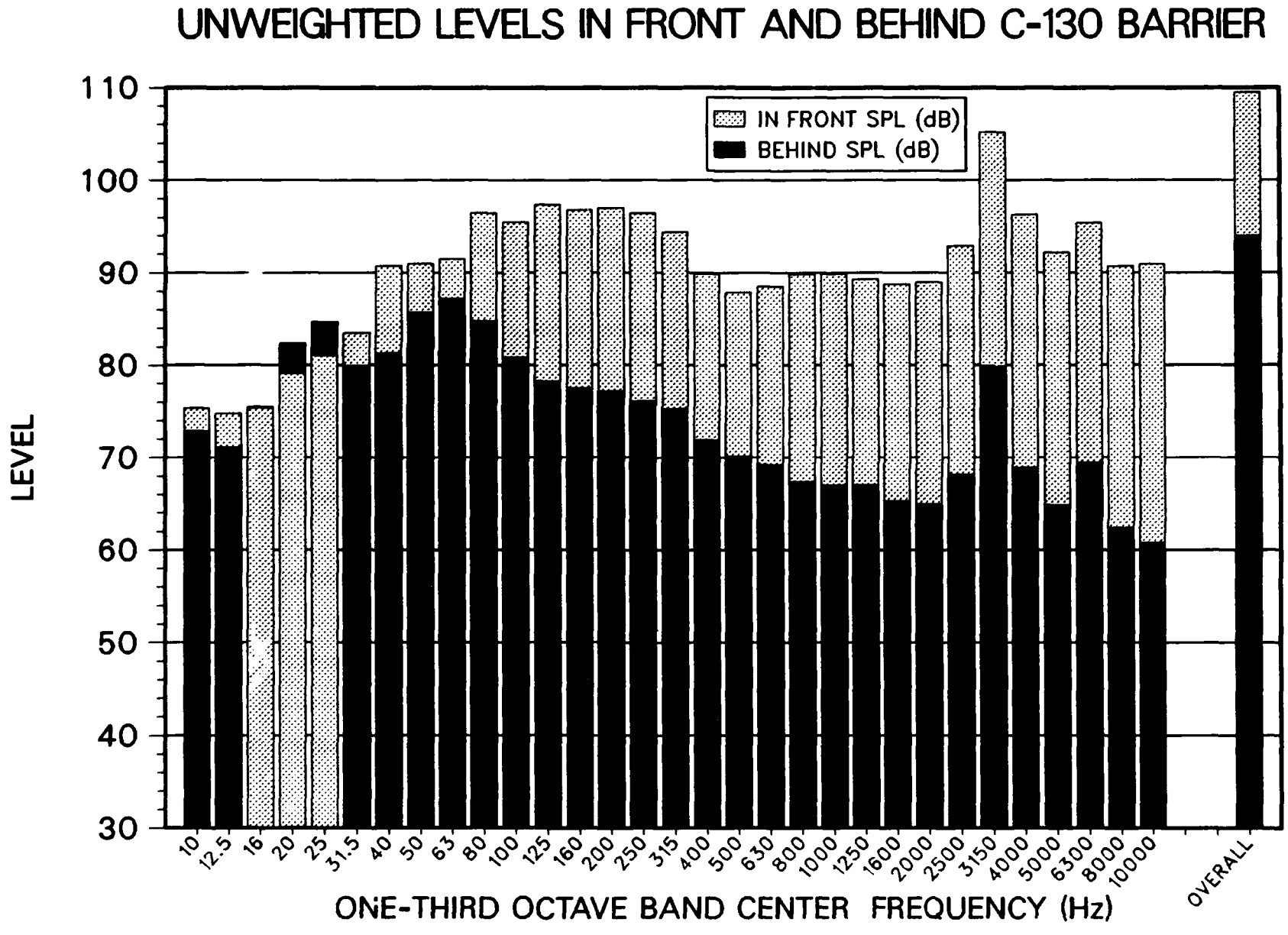
APPENDIX B

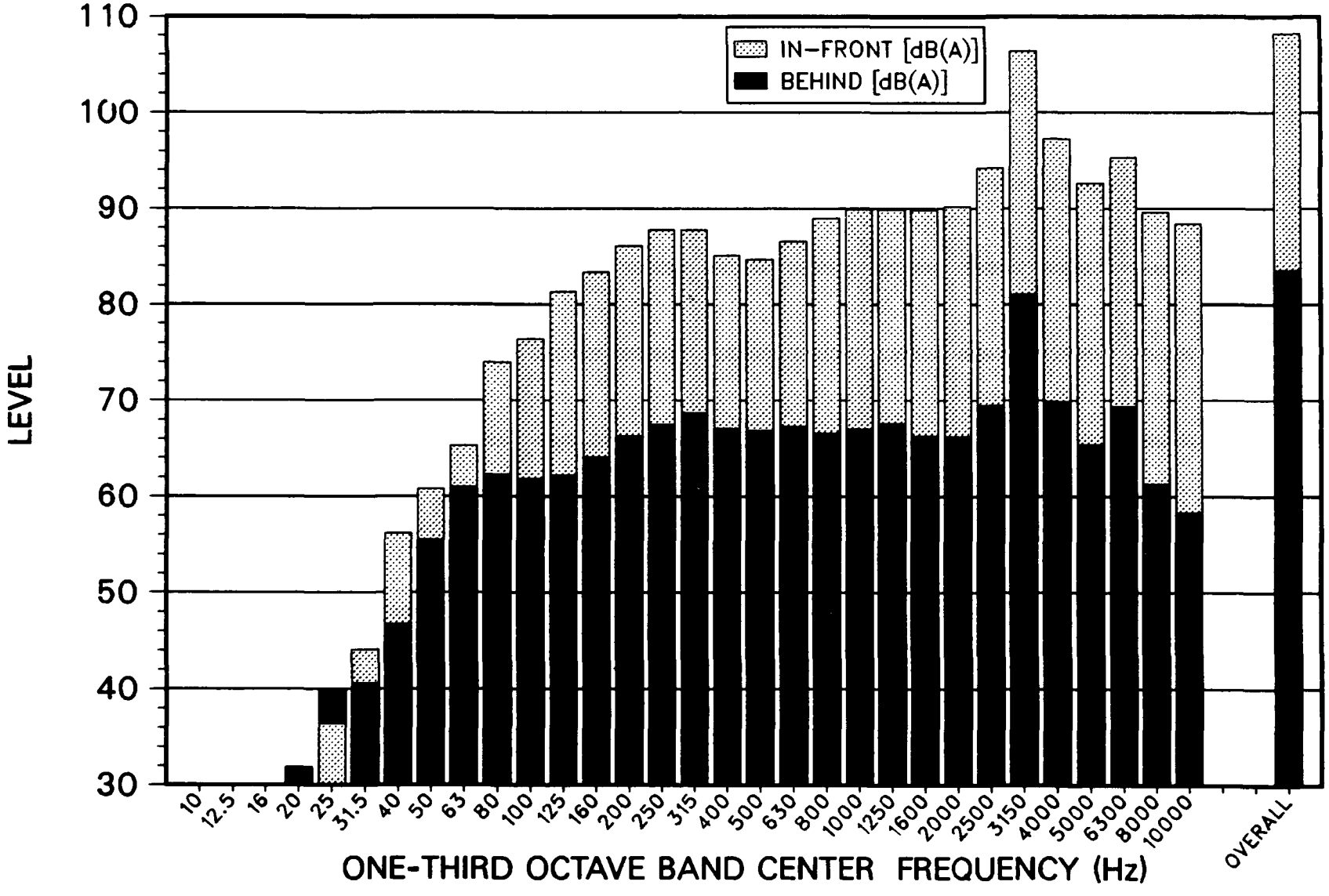
Barrier Reduction Summary

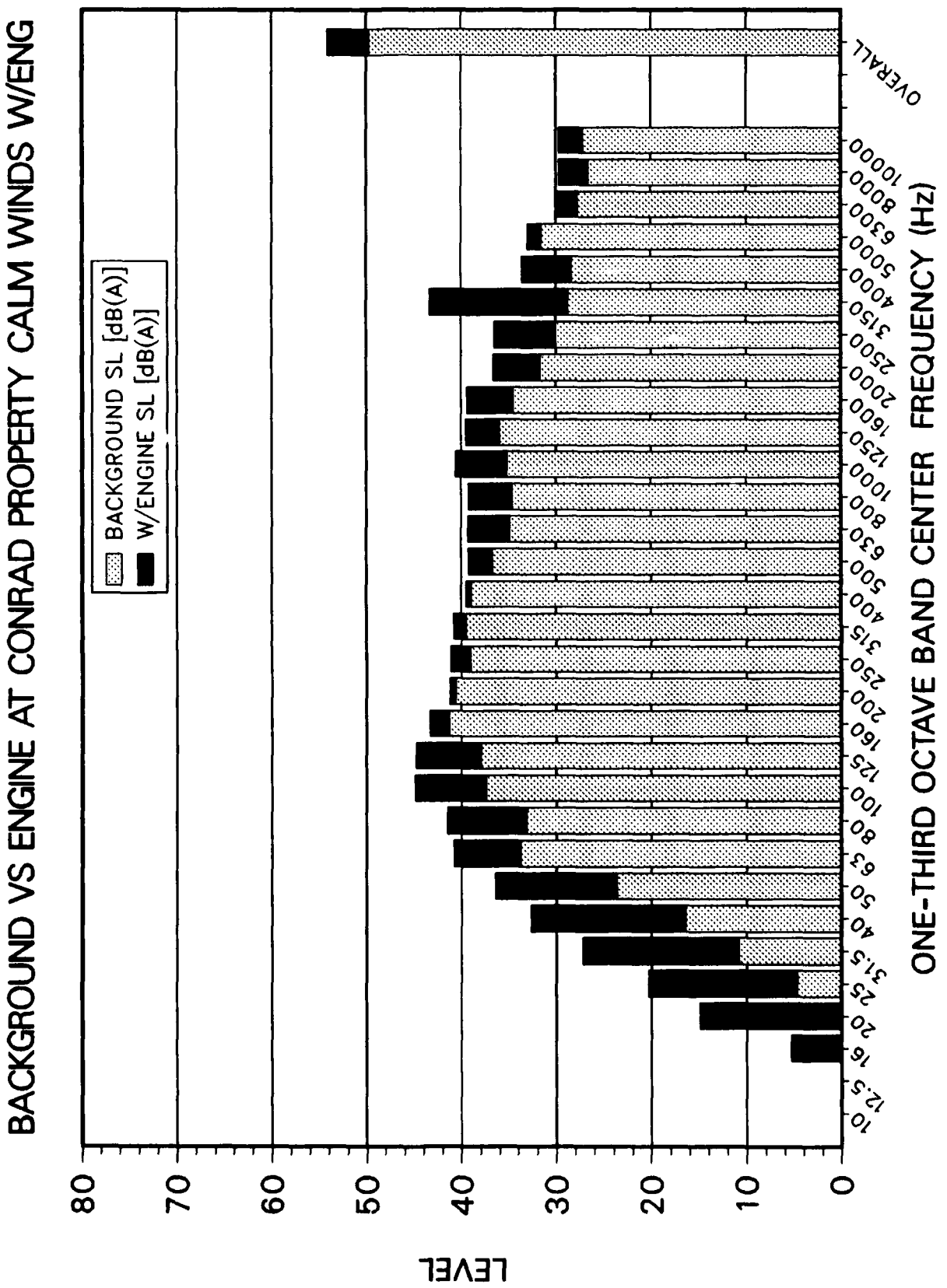

1987 VS 1989 LEVELS AT CONRAD PROPERTY W/ENG
1987 SL [dB(A)]
1989 SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

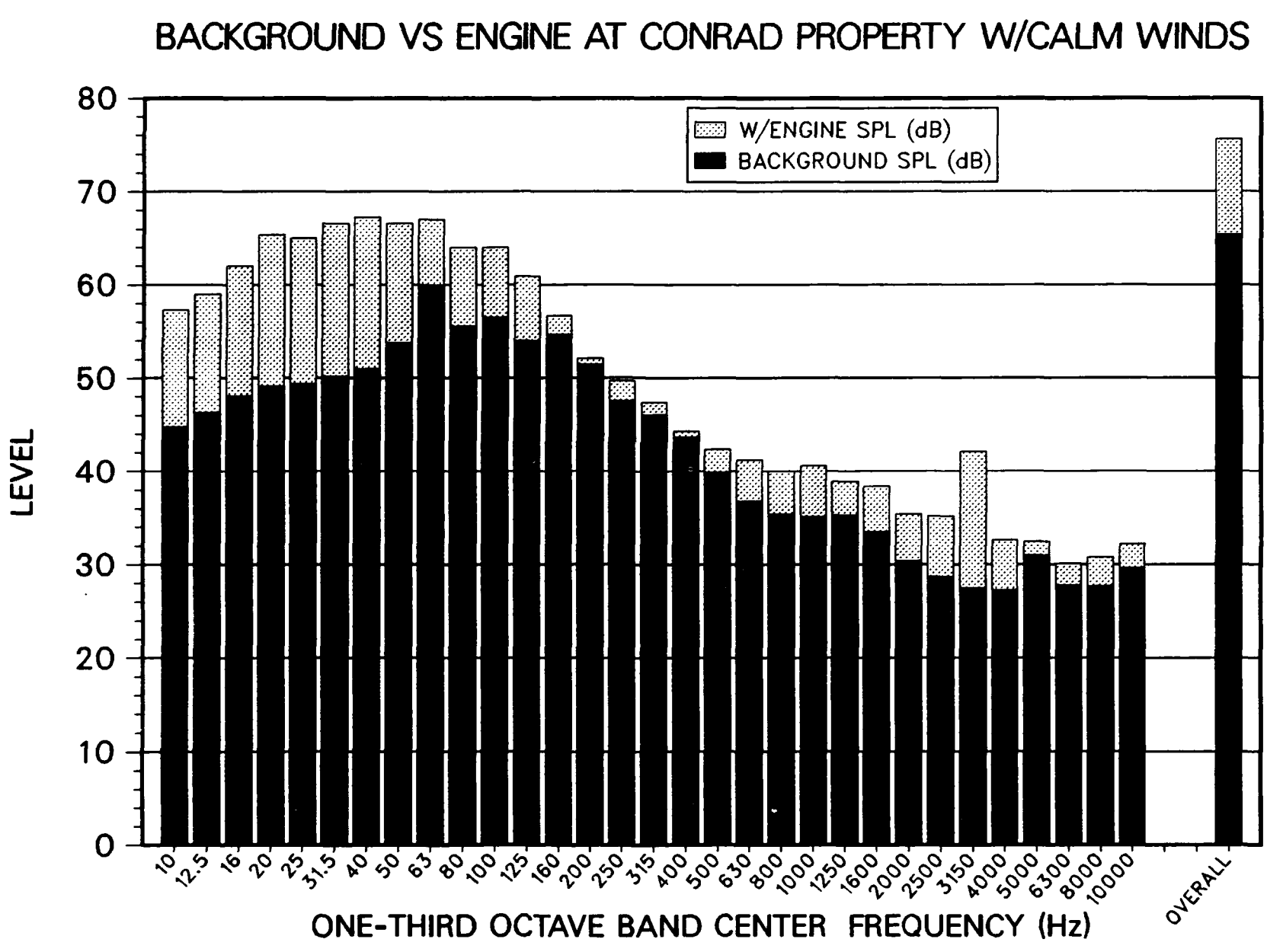

1987 VS 1989 CONRAD PROPERTY LEVELS W/ENG
1987 SPL (dB)
1989 SPL (dB)
LEVEL
90
80
70
60
50
40
30
20
10
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)


UNWEIGHTED LEVELS IN FRONT AND BEHIND C-130 BARRIER
IN FRONT SPL (dB)
BEHIND SPL (dB)
LEVEL
110
100
90
80
70
60
50
40
30
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

LEVELS IN FRONT AND BEHIND C-130 BARRIER




BACKGROUND VS ENGINE AT CONRAD PROPERTY CALM WINDS W/ENG
BACKGROUND SL [dB(A)]
W/ENGINE SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL


BACKGROUND VS ENGINE AT CONRAD PROPERTY W/CALM WINDS
W/ENGINE SPL (dB)
BACKGROUND SPL (dB)
LEVEL
80
70
60
50
40
30
20
10
0
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

BACKGROUND AT CONRAD PROPERTY W/CALM WINDS

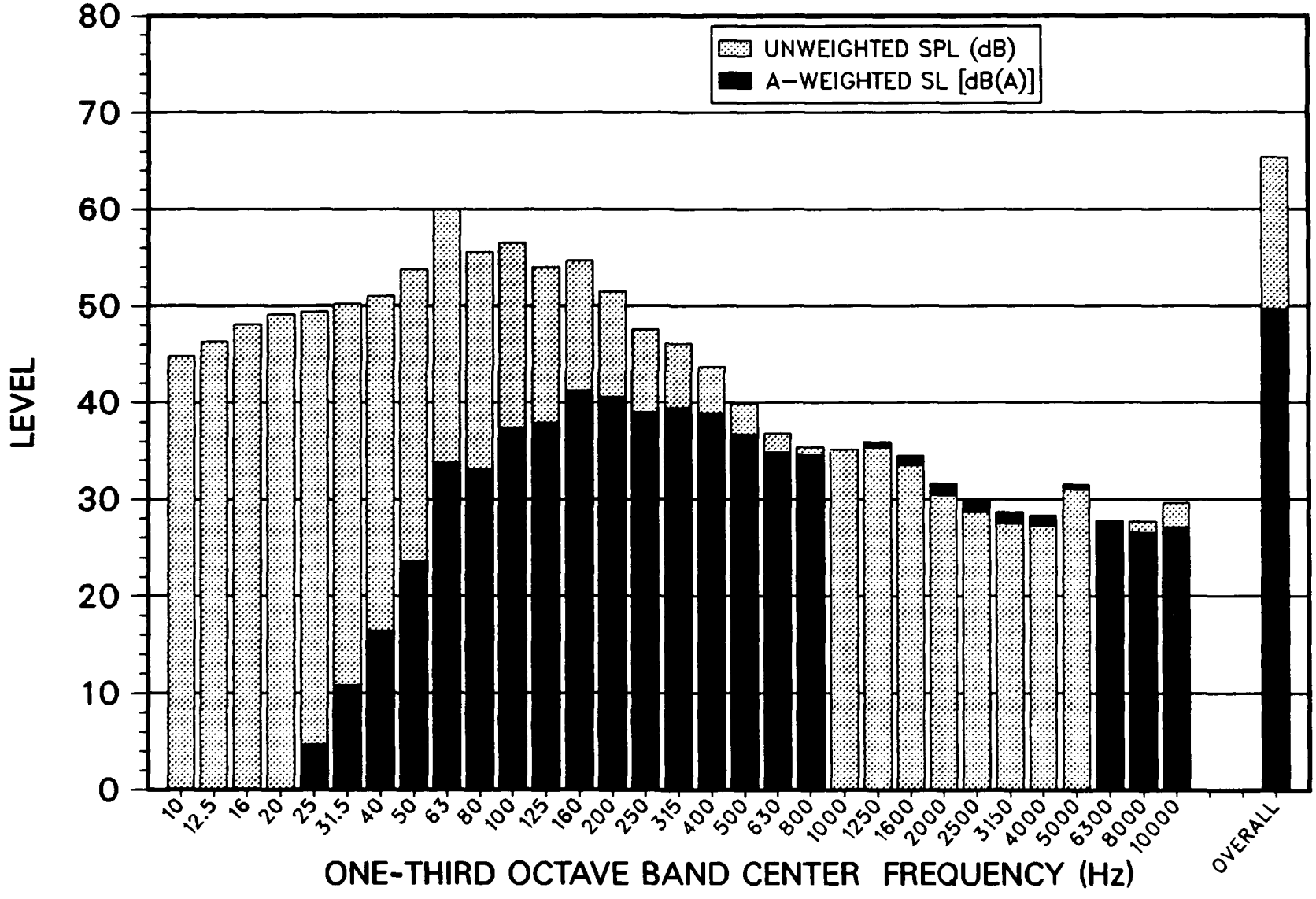
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	44.8		0		27.1	
12.5	46.3		0		32	
16	48.1	52.8	0	4.8	36.9	42.5
20	49.1		0		40.6	
25	49.4		4.7		43.2	
31.5	50.2	55	10.8	17.7	45.8	50.9
40	51		16.4		48	
50	53.8		23.6		51.8	
63	60	62	33.8	36.7	58.7	60.8
80	55.6		33.1		54.8	
100	56.5		37.4		56	
125	54	60	37.9	44	53.7	59.6
160	54.7		41.3		54.5	
200	51.5		40.6		51.4	
250	47.6	53.8	39	44.5	47.6	53.7
315	46.1		39.5		46.1	
400	43.7		38.9		43.7	
500	39.9	45.8	36.7	41.9	39.9	45.8
630	36.8		34.9		36.8	
800	35.4		34.6		35.4	
1,000	35.1	40	35.1	40	35.1	40
1,250	35.3		35.9		35.3	
1,600	33.5		34.5		33.5	
2,000	30.4	36.1	31.6	37.2	30.3	36
2,500	28.7		30		28.5	
3,150	27.5		28.7		27.2	
4,000	27.3	33.7	28.3	34.5	26.8	33.1
5,000	31		31.5		30.2	
6,300	27.8		27.7		26.5	
8,000	27.7	33.2	26.6	31.9	25.7	31.4
10,000	29.6		27.1		27.6	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 65.4 dB OASLA = 49.7 dB(A)

OASLC = 64.1 dB C-A = 14.4 dB

BACKGROUND AT CONRAD PROPERTY W/CALM WINDS



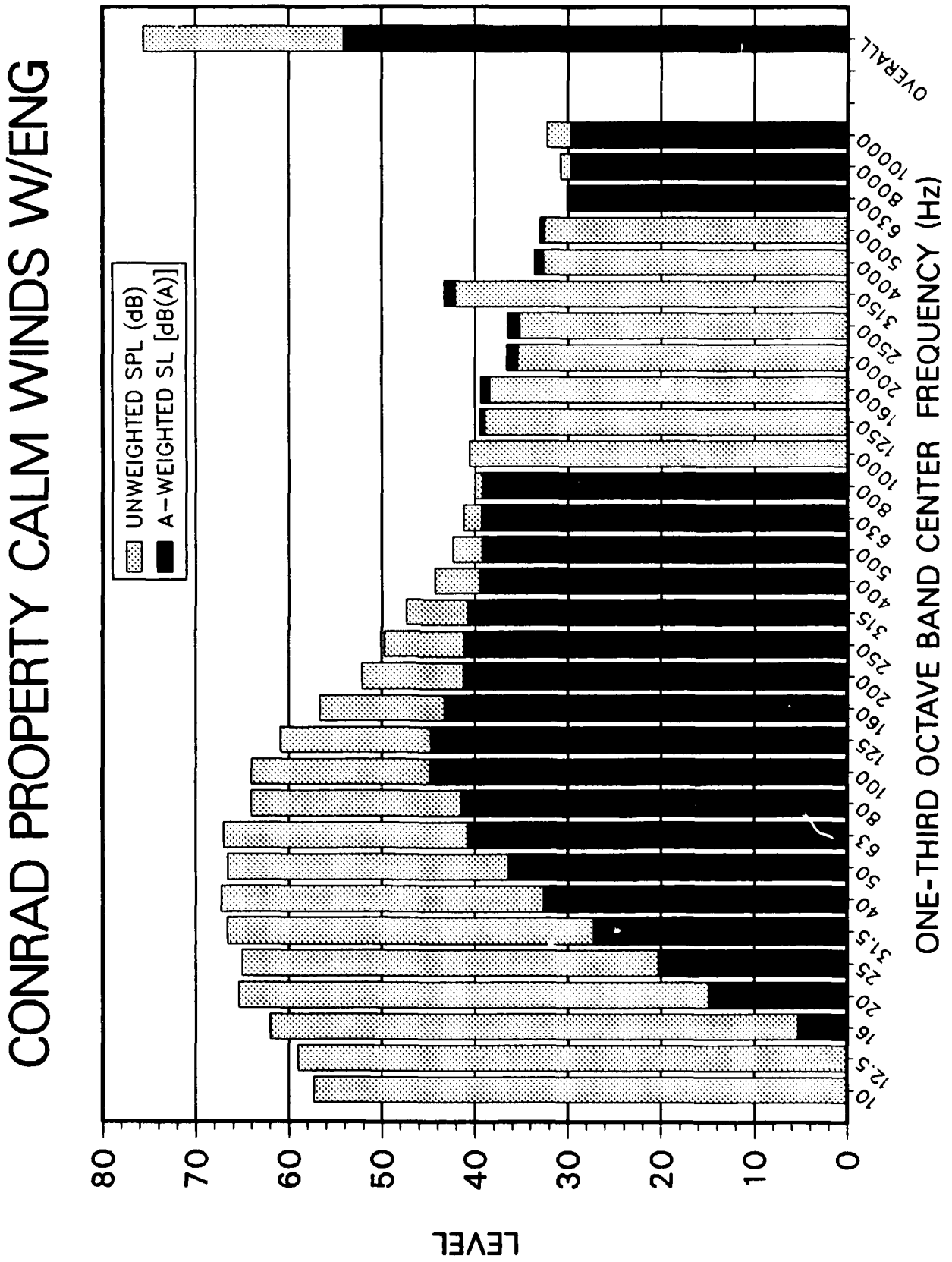
CONRAD PROPERTY CALM WINDS W/ENG

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	57.3		0		39.6	
12.5	59		0		44.7	
16	62	67.7	5.3	15.5	50.8	58.1
20	65.4		14.9		56.9	
25	65		20.3		58.8	
31.5	66.6	71.2	27.2	34	62.2	67.1
40	67.3		32.7		64.3	
50	66.6		36.4		64.6	
63	67	70.8	40.8	44.8	65.7	69.4
80	64		41.5		63.2	
100	64		44.9		63.5	
125	60.9	66.2	44.8	49.2	60.6	65.8
160	56.7		43.3		56.5	
200	52.1		41.2		52	
250	49.7	54.9	41.1	45.8	49.7	54.9
315	47.4		40.8		47.4	
400	44.3		39.5		44.3	
500	42.4	47.6	39.2	44.1	42.4	47.6
630	41.2		39.3		41.2	
800	40		39.2		40	
1,000	40.6	44.7	40.6	44.6	40.6	44.7
1,250	38.9		39.5		38.9	
1,600	38.4		39.4		38.4	
2,000	35.4	41.4	36.6	42.5	35.3	41.3
2,500	35.2		36.5		35	
3,150	42.1		43.3		41.8	
4,000	32.6	43	33.6	44.1	32.1	42.6
5,000	32.5		33		31.7	
6,300	30.1		30		28.8	
8,000	30.8	35.9	29.7	34.6	28.8	34.1
10,000	32.2		29.7		30.2	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 75.6 dB OASLA = 54.1 dB(A)

OASLC = 72.7 dB C-A = 18.6 dB


CONRAD PROPERTY CALM WINDS W/ENG
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

SITE 2 ENG MAX THRUST W/WIND

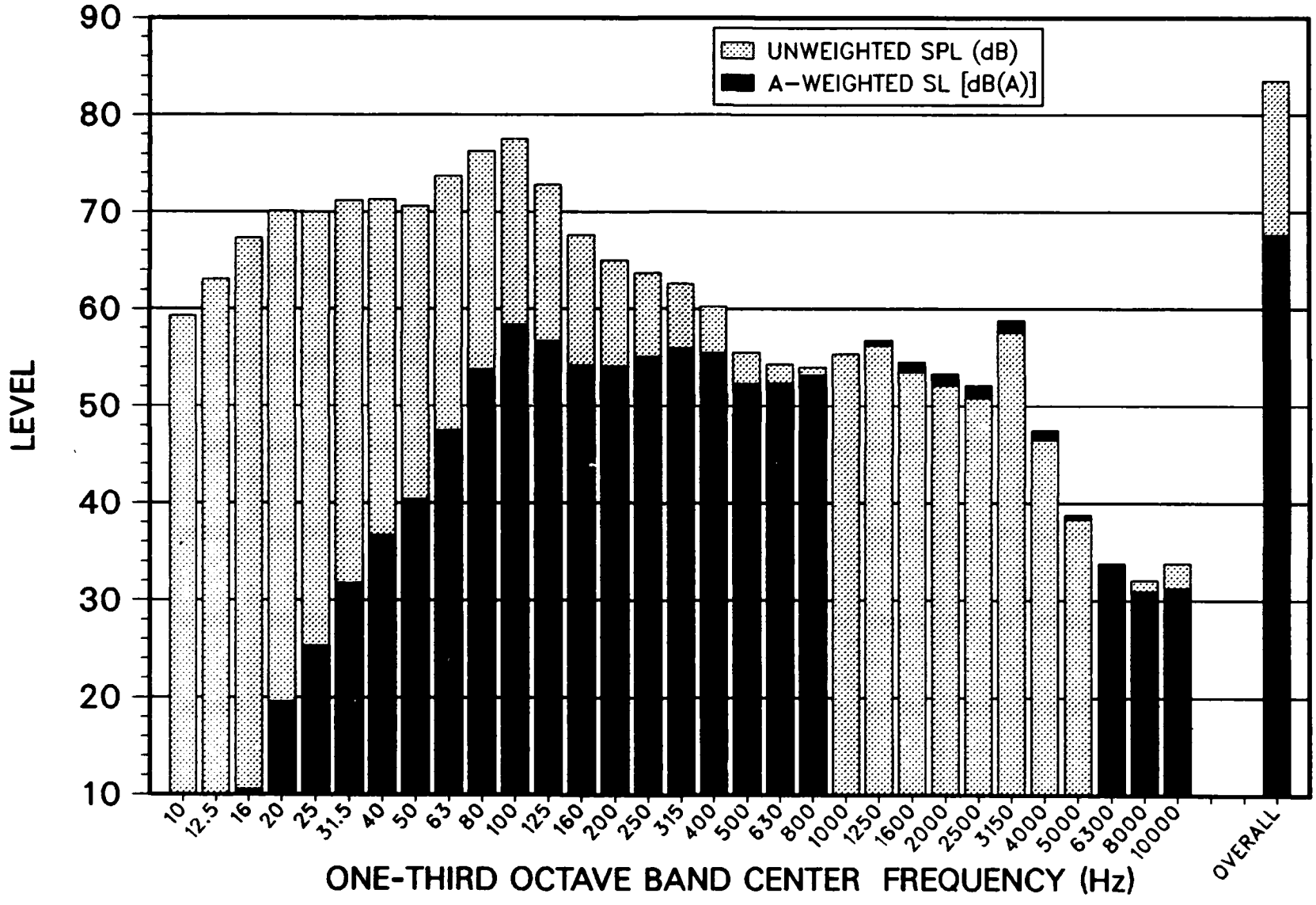
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	59.3		0		41.6	
12.5	63.1		0		48.8	
16	67.3	72.5	10.6	20.2	56.1	62.9
20	70.1		19.6		61.6	
25	70		25.3		63.8	
31.5	71.2	75.6	31.8	38.1	66.8	71.4
40	71.3		36.7		68.3	
50	70.6		40.4		68.6	
63	73.7	78.9	47.5	54.9	72.4	77.8
80	76.3		53.8		75.5	
100	77.5		58.4		77	
125	72.8	79.1	56.7	61.5	72.5	78.7
160	67.6		54.2		67.4	
200	65		54.1		64.9	
250	63.7	68.6	55.1	59.9	63.7	68.6
315	62.6		56		62.6	
400	60.3		55.5		60.3	
500	55.5	62.3	52.3	58.4	55.5	62.3
630	54.3		52.4		54.3	
800	54		53.2		54	
1,000	55.4	60.1	55.4	60.1	55.4	60.1
1,250	56.2		56.8		56.2	
1,600	53.5		54.5		53.5	
2,000	52.1	57	53.3	58.2	52	57
2,500	50.8		52.1		50.6	
3,150	57.6		58.8		57.3	
4,000	46.5	58	47.5	59.2	46	57.7
5,000	38.3		38.8		37.5	
6,300	33.8		33.7		32.5	
8,000	32.1	38.1	31	36.9	30.1	36.3
10,000	33.8		31.3		31.8	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 83.6 dB OASLA = 67.7 dB(A)

OASLC = 82.1 dB C-A = 14.4 dB

SITE 2 ENG MAX THRUST W/WIND



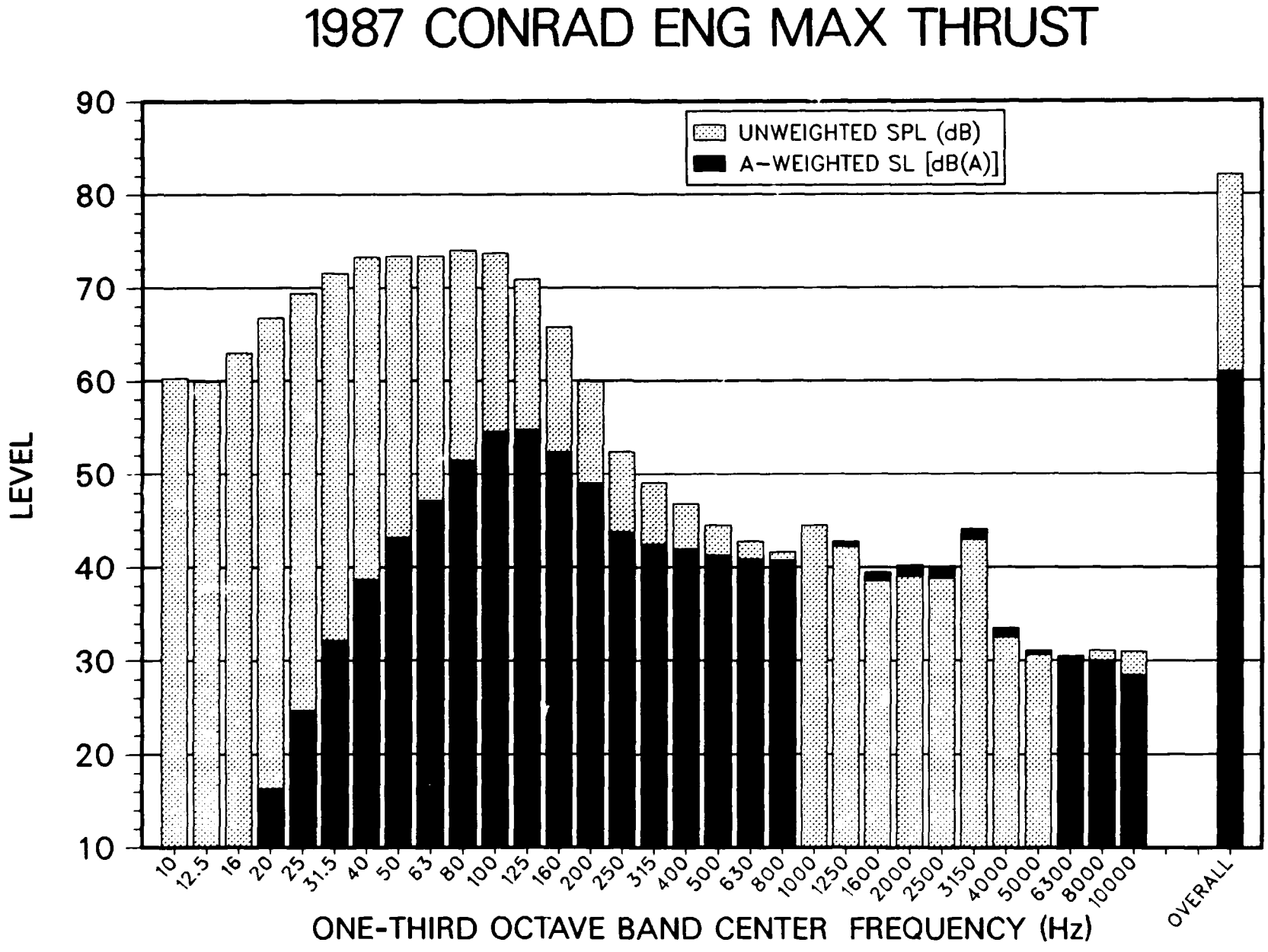
1987 CONRAD ENG MAX THRUST

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	60.3		0		42.6	
12.5	59.9		0		45.6	
16	63	68.9	6.3	16.8	51.8	59.4
20	66.8		16.3		58.3	
25	69.4		24.7		63.2	
31.5	71.6	76.5	32.2	39.7	67.2	72.6
40	73.3		38.7		70.3	
50	73.4		43.2		71.4	
63	73.4	78.4	47.2	53.3	72.1	77.1
80	74		51.5		73.2	
100	73.7		54.6		73.2	
125	70.9	76	54.8	58.8	70.6	75.6
160	65.8		52.4		65.6	
200	59.9		49		59.8	
250	52.4	60.9	43.8	50.8	52.4	60.8
315	49.1		42.5		49.1	
400	46.8		42		46.8	
500	44.5	49.8	41.3	46.2	44.5	49.8
630	42.8		40.9		42.8	
800	41.6		40.8		41.6	
1,000	44.5	47.7	44.5	47.7	44.5	47.7
1,250	42.2		42.8		42.2	
1,600	38.5		39.5		38.5	
2,000	39	43.5	40.2	44.7	38.9	43.4
2,500	38.8		40.1		38.6	
3,150	42.9		44.1		42.6	
4,000	32.5	43.5	33.5	44.7	32	43.2
5,000	30.6		31.1		29.8	
6,300	30.5		30.4		29.2	
8,000	31.1	35.6	30	34.5	29.1	33.9
10,000	31		28.5		29	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 82.1 dB OASLA = 61 dB(A)

OASLC = 80.3 dB C-A = 19.3 dB


1987 CONRAD ENG MAX THRUST
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
90
80
70
60
50
40
30
20
10
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

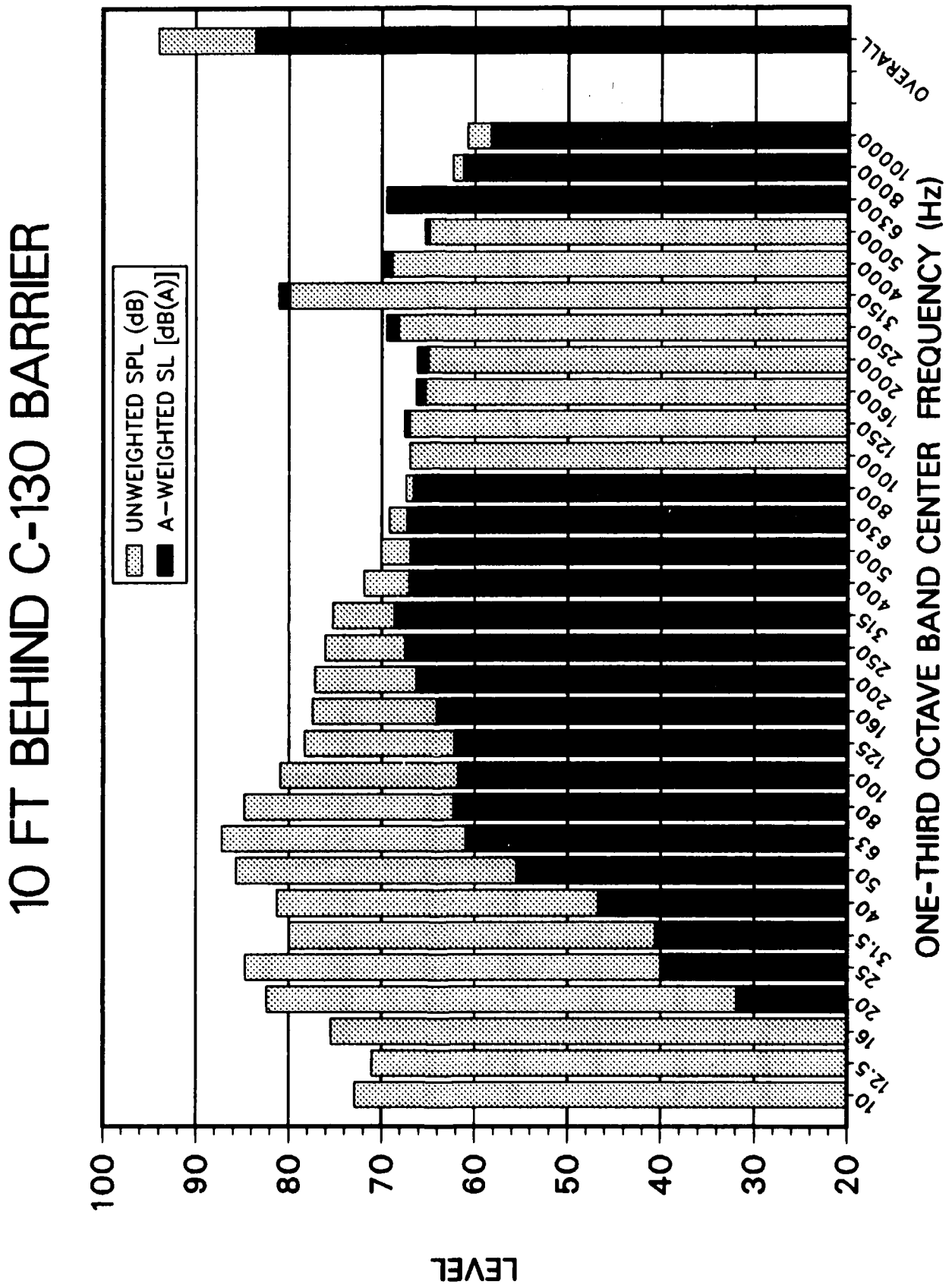
10 FT BEHIND C-130 BARRIER

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	72.9		2.5		55.2	
12.5	71.1		7.7		56.8	
16	75.5	83.5	18.8	32.1	64.3	74.4
20	82.4		31.9		73.9	
25	84.7		40		78.5	
31.5	80	87.2	40.6	48.3	75.6	82.4
40	81.3		46.7		78.3	
50	85.7		55.5		83.7	
63	87.2	90.8	61	65.2	85.9	89.4
80	84.8		62.3		84	
100	80.9		61.8		80.4	
125	78.3	83.9	62.2	67.6	78	83.5
160	77.5		64.1		77.3	
200	77.2		66.3		77.1	
250	76.1	81	67.5	72.4	76.1	81
315	75.3		68.7		75.3	
400	71.9		67.1		71.9	
500	70.1	75.3	66.9	71.9	70.1	75.3
630	69.2		67.3		69.2	
800	67.4		66.6		67.4	
1,000	67	71.9	67	71.9	67	71.9
1,250	67		67.6		67	
1,600	65.3		66.3		65.3	
2,000	65	71.2	66.2	72.4	64.9	71.1
2,500	68.2		69.5		68	
3,150	79.9		81.1		79.6	
4,000	68.9	80.4	69.9	81.5	68.4	80
5,000	64.9		65.4		64.1	
6,300	69.5		69.4		68.2	
8,000	62.4	70.7	61.3	70.3	60.4	69.3
10,000	60.8		58.3		58.8	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 94 dB OASLA = 83.6 dB(A)

OASLC = 92 dB C-A = 8.4 dB


10 FT BEHIND C-130 BARRIER
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
100
90
80
70
60
50
40
30
20
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

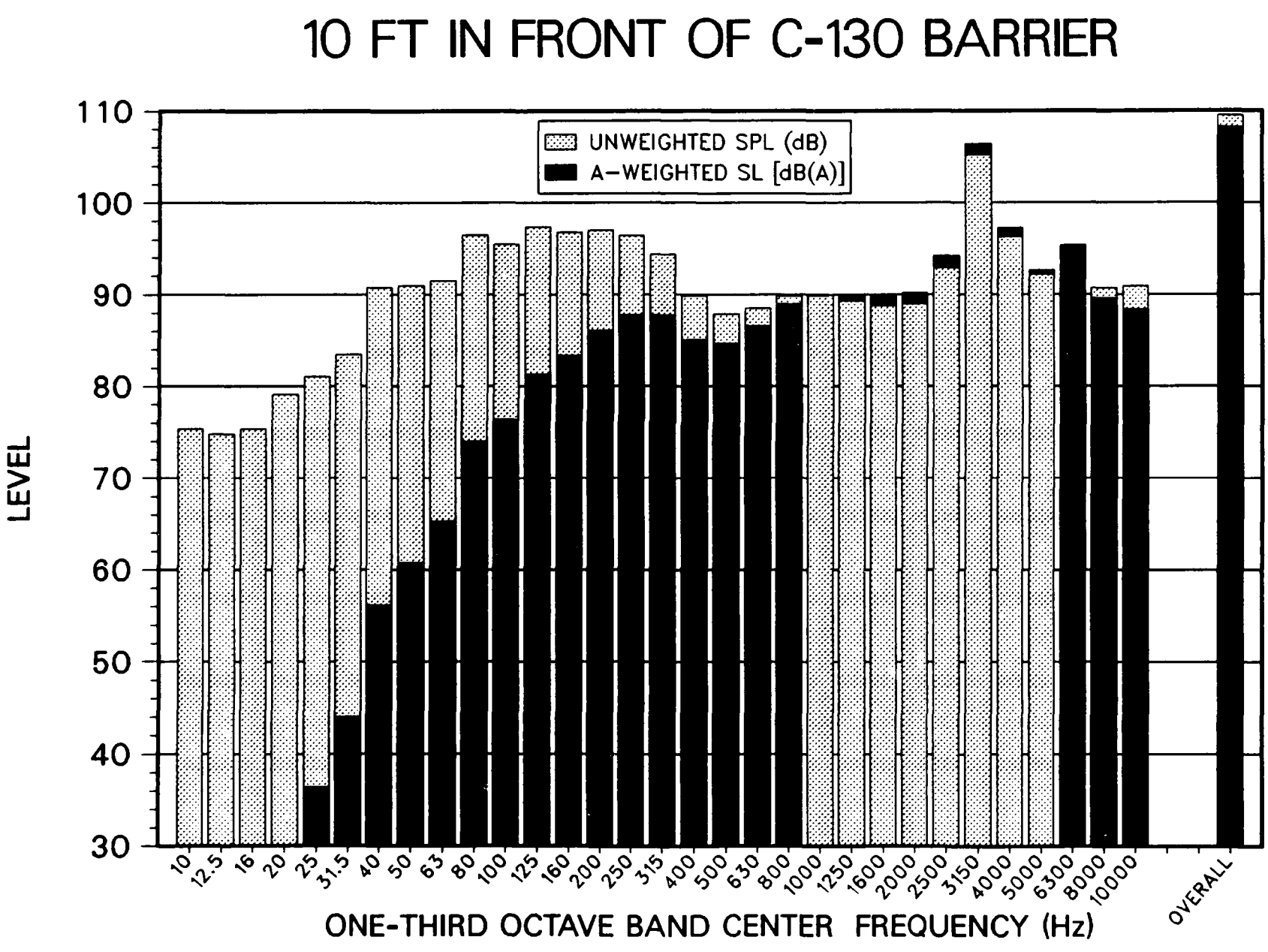
10 FT IN FRONT OF C-130 BARRIER

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	75.4		5		57.7	
12.5	74.8		11.4		60.5	
16	75.4	81.6	18.7	29.1	64.2	71.8
20	79.1		28.6		70.6	
25	81.1		36.4		74.9	
31.5	83.5	91.9	44.1	56.5	79.1	88.5
40	90.8		56.2		87.8	
50	91		60.8		89	
63	91.5	98.5	65.3	74.7	90.2	97.4
80	96.5		74		95.7	
100	95.5		76.4		95	
125	97.4	101.4	81.3	86	97.1	101.1
160	96.8		83.4		96.6	
200	97		86.1		96.9	
250	96.4	100.8	87.8	92.1	96.4	100.8
315	94.4		87.8		94.4	
400	89.9		85.1		89.9	
500	87.9	93.6	84.7	90.3	87.9	93.6
630	88.5		86.6		88.5	
800	89.8		89		89.8	
1,000	89.9	94.4	89.9	94.4	89.9	94.4
1,250	89.3		89.9		89.3	
1,600	88.8		89.8		88.8	
2,000	89	95.4	90.2	96.7	88.9	95.3
2,500	92.9		94.2		92.7	
3,150	105.2		106.4		104.9	
4,000	96.3	105.9	97.3	107.1	95.8	105.6
5,000	92.2		92.7		91.4	
6,300	95.4		95.3		94.1	
8,000	90.7	97.7	89.6	97	88.7	96.1
10,000	90.9		88.4		88.9	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 109.5 dB OASLA = 108.2 dB(A)

OASLC = 109 dB C-A = .8 dB


10 FT IN FRONT OF C-130 BARRIER
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
110
100
90
80
70
60
50
40
30
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

10 FT BEHIND A-10 BARRIER

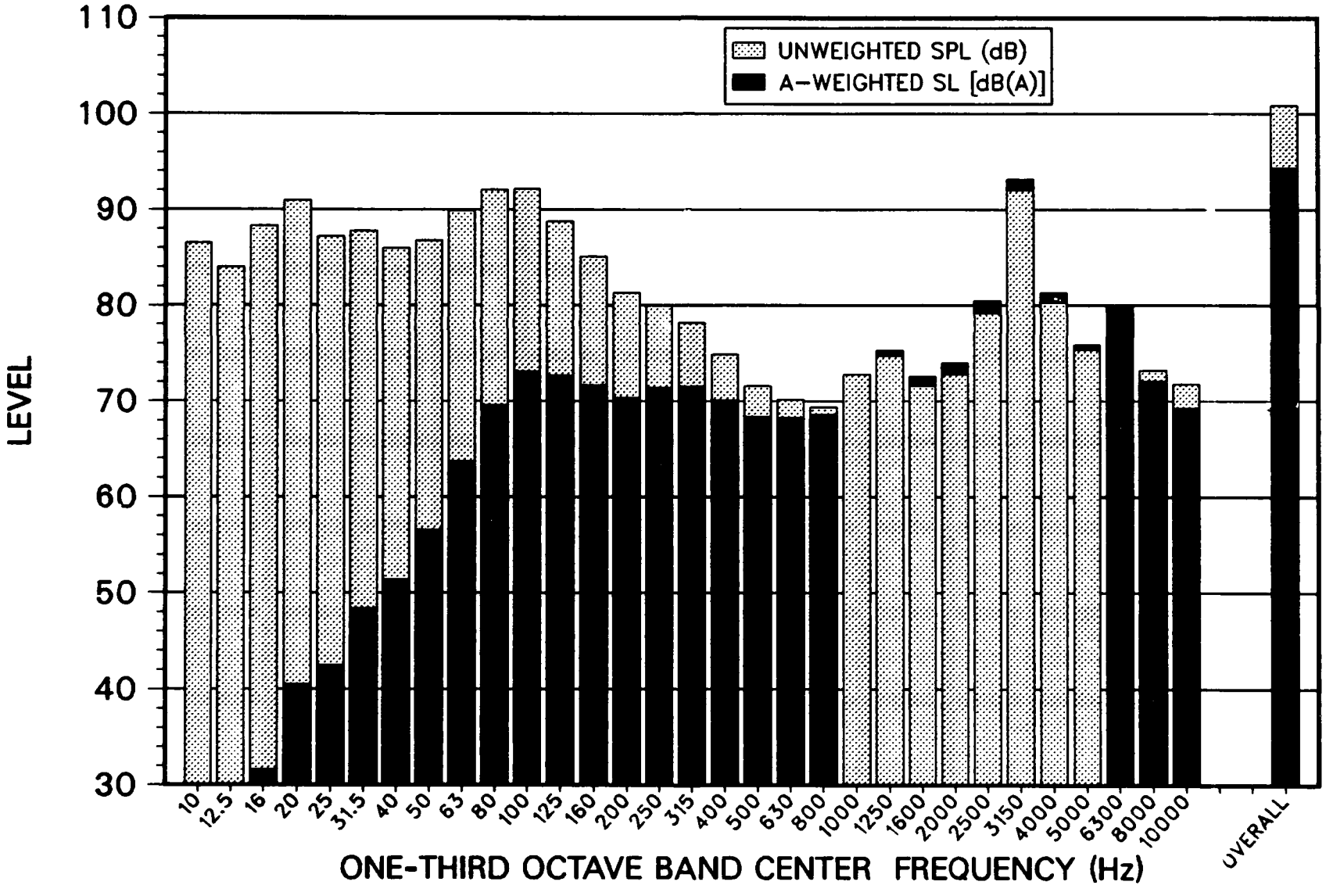
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	86.5		16.1		68.8	
12.5	84		20.6		69.7	
16	88.3	93.4	31.6	41.1	77.1	83.8
20	91		40.5		82.5	
25	87.2		42.5		81	
31.5	87.8	91.8	48.4	53.5	83.4	87.4
40	86		51.4		83	
50	86.8		56.6		84.8	
63	89.9	94.9	63.7	70.8	88.6	93.8
80	92.1		69.6		91.3	
100	92.2		73.1		91.7	
125	88.8	94.4	72.7	77.3	88.5	94
160	85.1		71.7		84.9	
200	81.3		70.4		81.2	
250	80	84.8	71.4	75.9	80	84.7
315	78.2		71.6		78.2	
400	74.9		70.1		74.9	
500	71.6	77.5	68.4	73.8	71.6	77.5
630	70.2		68.3		70.2	
800	69.4		68.6		69.4	
1,000	72.8	77.6	72.8	77.8	72.8	77.6
1,250	74.7		75.3		74.7	
1,600	71.6		72.6		71.6	
2,000	72.8	80.7	74	81.9	72.7	80.5
2,500	79.2		80.5		79	
3,150	92		93.2		91.7	
4,000	80.3	92.4	81.3	93.5	79.8	92.1
5,000	75.4		75.9		74.6	
6,300	80.1		80		78.8	
8,000	73.2	81.4	72.1	81	71.2	79.9
10,000	71.8		69.3		69.8	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 100.9 dB OASLA = 94.4 dB(A)

OASLC = 99 dB C-A = 4.6 dB

10 FT BEHIND A-10 BARRIER



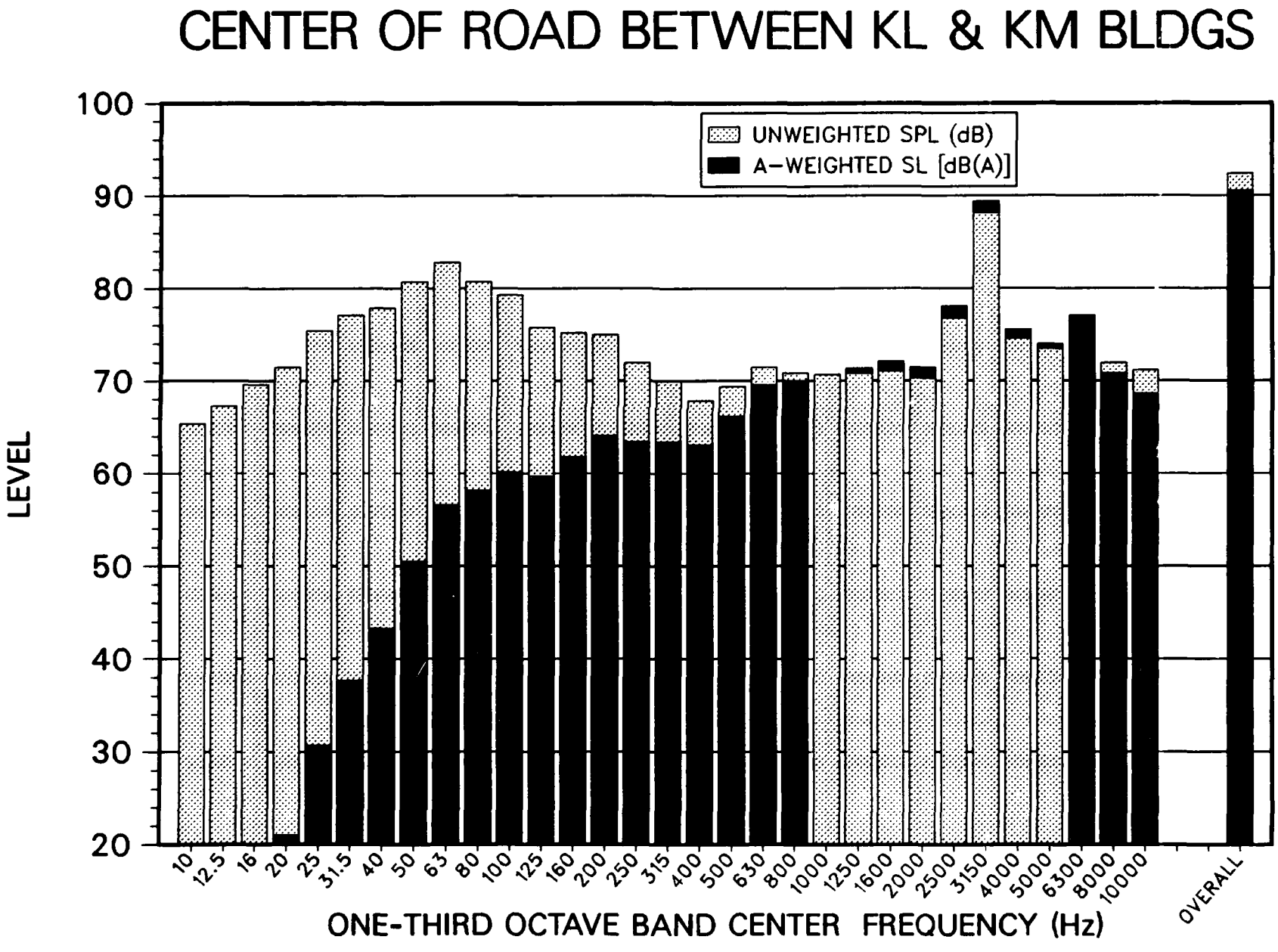
CENTER OF ROAD BETWEEN KL & KM BLDGS

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	65.4		0		47.7	
12.5	67.3		3.9		53	
16	69.6	74.6	12.9	21.7	58.4	64.6
20	71.5		21		63	
25	75.4		30.7		69.2	
31.5	77.1	81.7	37.7	44.5	72.7	77.6
40	77.9		43.3		74.9	
50	80.7		50.5		78.7	
63	82.8	86.3	56.6	60.9	81.5	85
80	80.7		58.2		79.9	
100	79.3		60.2		78.8	
125	75.8	81.9	59.7	65.4	75.5	81.6
160	75.2		61.8		75	
200	75		64.1		74.9	
250	72	77.6	63.4	68.4	72	77.5
315	70		63.4		70	
400	67.9		63.1		67.9	
500	69.4	74.6	66.2	71.9	69.4	74.6
630	71.5		69.6		71.5	
800	70.9		70.1		70.9	
1,000	70.7	75.6	70.7	75.5	70.7	75.6
1,250	70.8		71.4		70.8	
1,600	71.1		72.1		71.1	
2,000	70.3	78.5	71.5	79.8	70.2	78.4
2,500	76.8		78.1		76.6	
3,150	88.2		89.4		87.9	
4,000	74.6	88.5	75.6	89.7	74.1	88.2
5,000	73.5		74		72.7	
6,300	77.1		77		75.8	
8,000	72	79	70.9	78.4	70	77.5
10,000	71.2		68.7		69.2	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 92.4 dB OASLA = 90.6 dB(A)

OASLC = 91.5 dB C-A = .9 dB


CENTER OF ROAD BETWEEN KL & KM BLDGS
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
100
90
80
70
60
50
40
30
20
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

GAP BETWEEN & BEHIND BARRIERS

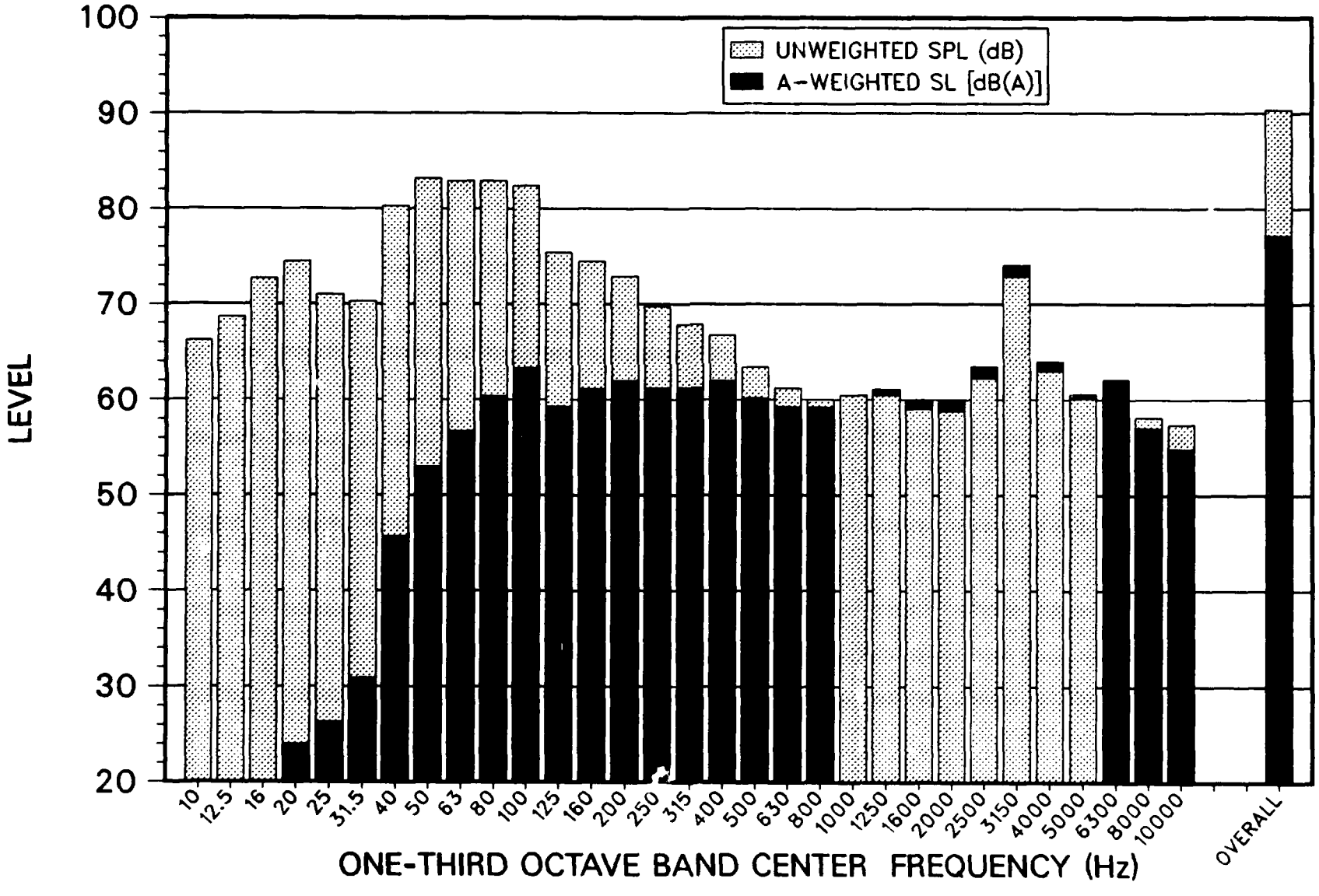
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	66.2		0		48.5	
12.5	68.7		5.3		54.4	
16	72.7	77.3	16	24.7	61.5	67.5
20	74.5		24		66	
25	71		26.3		64.8	
31.5	70.3	81.2	30.9	45.9	65.9	77.8
40	80.3		45.7		77.3	
50	83.2		53		81.2	
63	82.9	87.8	56.7	62.5	81.6	86.4
80	82.9		60.4		82.1	
100	82.4		63.3		81.9	
125	75.4	83.7	59.3	66.3	75.1	83.3
160	74.5		61.1		74.3	
200	72.9		62		72.8	
250	69.8	75.5	61.2	66.3	69.8	75.4
315	67.9		61.3		67.9	
400	66.8		62		66.8	
500	63.4	69.2	60.2	65.4	63.4	69.2
630	61.2		59.3		61.2	
800	60		59.2		60	
1,000	60.5	65.1	60.5	65.1	60.5	65.1
1,250	60.5		61.1		60.5	
1,600	59		60		59	
2,000	58.8	65.1	60	66.3	58.7	64.9
2,500	62.2		63.5		62	
3,150	72.9		74.1		72.6	
4,000	63	73.5	64	74.7	62.5	73.2
5,000	60.1		60.6		59.3	
6,300	62.1		62		60.8	
8,000	58.1	64.5	57	63.8	56.1	62.9
10,000	57.4		54.9		55.4	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 90.4 dB OASLA = 77.2 dB(A)

OASLC = 89 dB C-A = 11.8 dB

GAP BETWEEN & BEHIND BARRIERS



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APPENDIX C

Circle Data

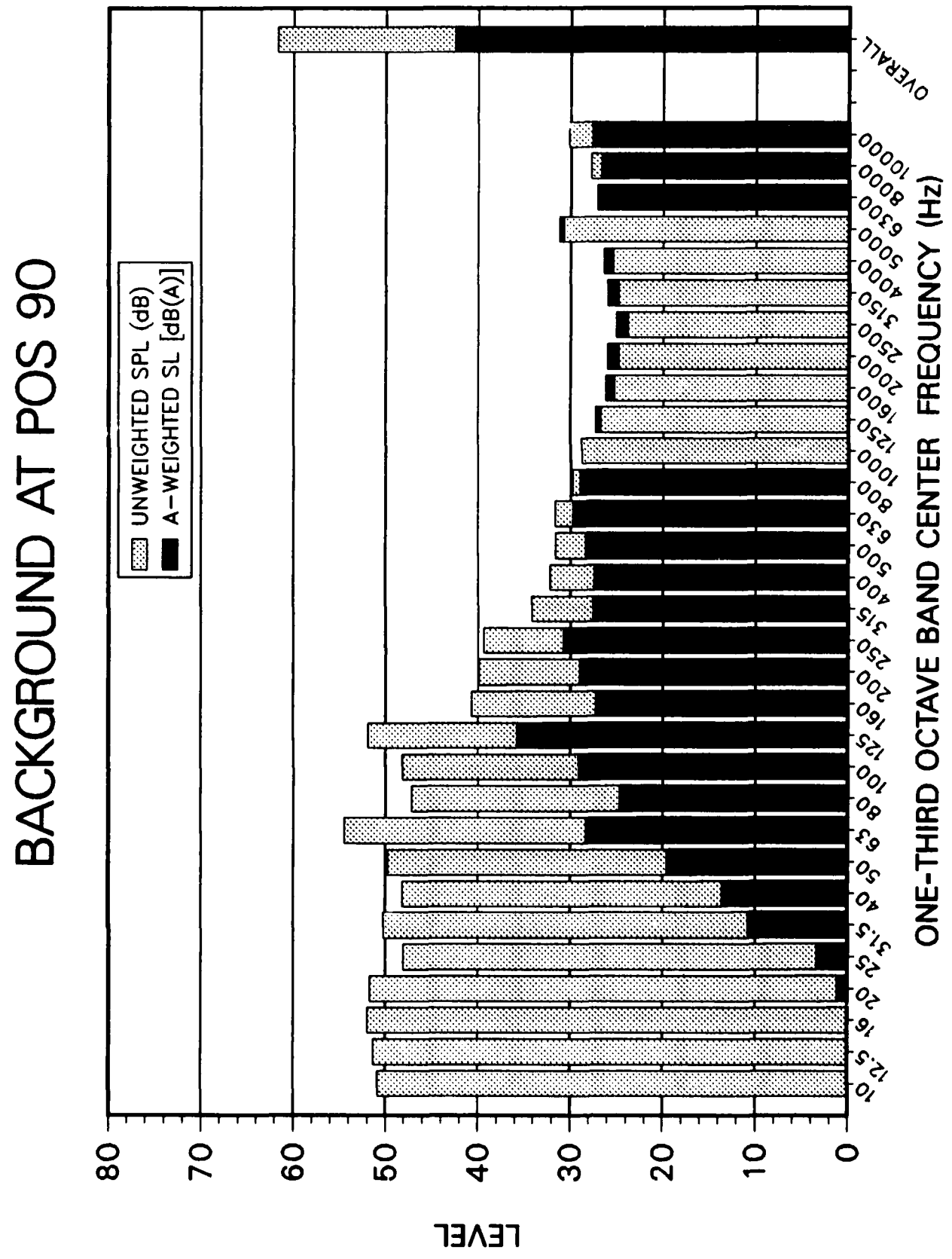
BACKGROUND AT POS 90

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	50.9		0		33.2	
12.5	51.3		0		37	
16	52	56.4	0	5.2	40.8	45.8
20	51.7		1.2		43.2	
25	48.1		3.4		41.9	
31.5	50.2	53.7	10.8	15.7	45.8	49.4
40	48.2		13.6		45.2	
50	49.8		19.6		47.8	
63	54.5	56.3	28.3	30.3	53.2	55
80	47.2		24.7		46.4	
100	48.2		29.1		47.7	
125	51.9	53.7	35.8	37.1	51.6	53.3
160	40.7		27.3		40.5	
200	39.9		29		39.8	
250	39.4	43.2	30.8	34.1	39.4	43.2
315	34.2		27.6		34.2	
400	32.2		27.4		32.2	
500	31.6	36.6	28.4	33.4	31.6	36.6
630	31.7		29.8		31.7	
800	29.8		29		29.8	
1,000	28.8	33.4	28.8	33.2	28.8	33.4
1,250	26.7		27.3		26.7	
1,600	25.2		26.2		25.2	
2,000	24.8	29.4	26	30.6	24.7	29.3
2,500	23.8		25.1		23.6	
3,150	24.8		26		24.5	
4,000	25.4	32.6	26.4	33.3	24.9	32
5,000	30.7		31.2		29.9	
6,300	27.1		27		25.8	
8,000	27.8	33.3	26.7	31.9	25.8	31.5
10,000	30.2		27.7		28.2	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 61.7 dB OASLA = 42.5 dB(A)

OASLC = 58.4 dB C-A = 15.9 dB


BACKGROUND AT POS 90
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
80
70
60
50
40
30
20
10
0
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

98M POS 30 ENGINE MAX THRUST

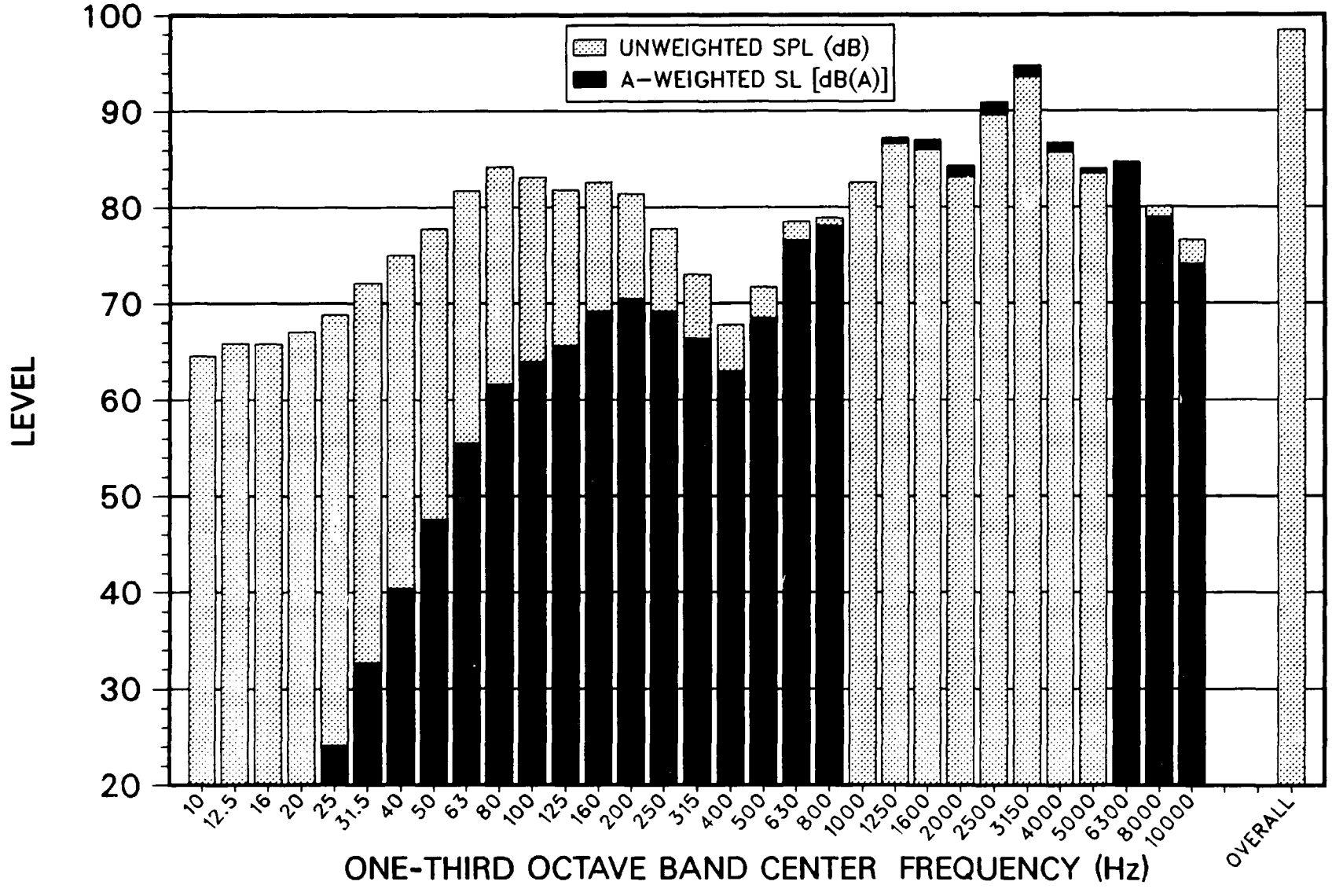
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	64.6		0		46.9	
12.5	65.9		2.5		51.6	
16	65.8	71.1	9.1	17.5	54.6	60.6
20	67.1		16.6		58.6	
25	68.8		24.1		62.6	
31.5	72.1	77.4	32.7	41.2	67.7	73.7
40	75		40.4		72	
50	77.8		47.6		75.8	
63	81.7	86.7	55.5	62.8	80.4	85.6
80	84.2		61.7		83.4	
100	83.1		64		82.6	
125	81.8	87.3	65.7	71.6	81.5	87
160	82.6		69.2		82.4	
200	81.4		70.5		81.3	
250	77.8	83.4	69.2	73.8	77.8	83.3
315	73		66.4		73	
400	67.8		63		67.8	
500	71.7	79.6	68.5	77.4	71.7	79.6
630	78.5		76.6		78.5	
800	78.9		78.1		78.9	
1,000	82.6	88.6	82.6	88.9	82.6	88.6
1,250	86.6		87.2		86.6	
1,600	86		87		86	
2,000	83.1	91.8	84.3	93	83	91.7
2,500	89.6		90.9		89.4	
3,150	93.5		94.7		93.2	
4,000	85.7	94.5	86.7	95.6	85.2	94.2
5,000	83.5		84		82.7	
6,300	84.7		84.6		83.4	
8,000	80.1	86.5	79	85.9	78.1	84.9
10,000	76.6		74.1		74.6	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 98.4 dB OASLA = 98.4 dB(A)

OASLC = 98 dB C-A = -.4 dB

98M POS 30 ENGINE MAX THRUST



100M POS 270 ENGINE MAX THRUST

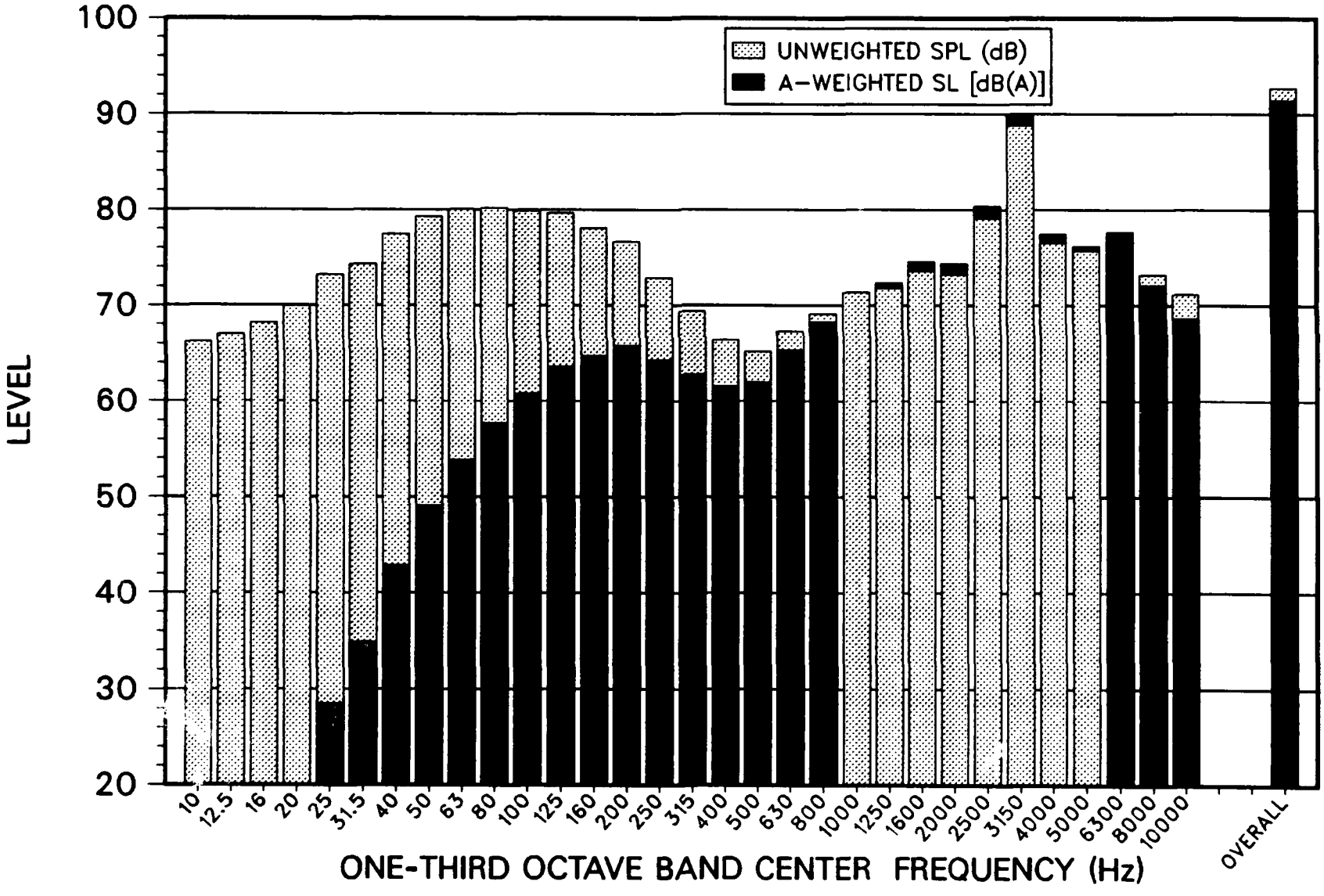
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	66.2		0		48.5	
12.5	67		3.6		52.7	
16	68.2	73.3	11.5	20.2	57	63.2
20	70		19.5		61.5	
25	73.2		28.5		67	
31.5	74.3	80.2	34.9	43.7	69.9	76.3
40	77.5		42.9		74.5	
50	79.3		49.1		77.3	
63	80.1	84.7	53.9	59.6	78.8	83.4
80	80.2		57.7		79.4	
100	79.9		60.8		79.4	
125	79.7	84.1	63.6	68.1	79.4	83.7
160	78.1		64.7		77.9	
200	76.7		65.8		76.6	
250	72.9	78.7	64.3	69.2	72.9	78.7
315	69.4		62.8		69.4	
400	66.4		61.6		66.4	
500	65.2	71.2	62	68.1	65.2	71.2
630	67.3		65.4		67.3	
800	69.1		68.3		69.1	
1,000	71.4	75.7	71.4	75.8	71.4	75.7
1,250	71.8		72.4		71.8	
1,600	73.6		74.6		73.6	
2,000	73.2	81	74.4	82.2	73.1	80.8
2,500	79.1		80.4		78.9	
3,150	88.8		90		88.5	
4,000	76.5	89.2	77.5	90.4	76	88.9
5,000	75.7		76.2		74.9	
6,300	77.7		77.6		76.4	
8,000	73.2	79.7	72.1	79.1	71.2	78.1
10,000	71.2		68.7		69.2	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 92.7 dB OASLA = 91.5 dB(A)

OASLC = 92 dB C-A = .5 dB

100M POS 270 ENGINE MAX THRUST



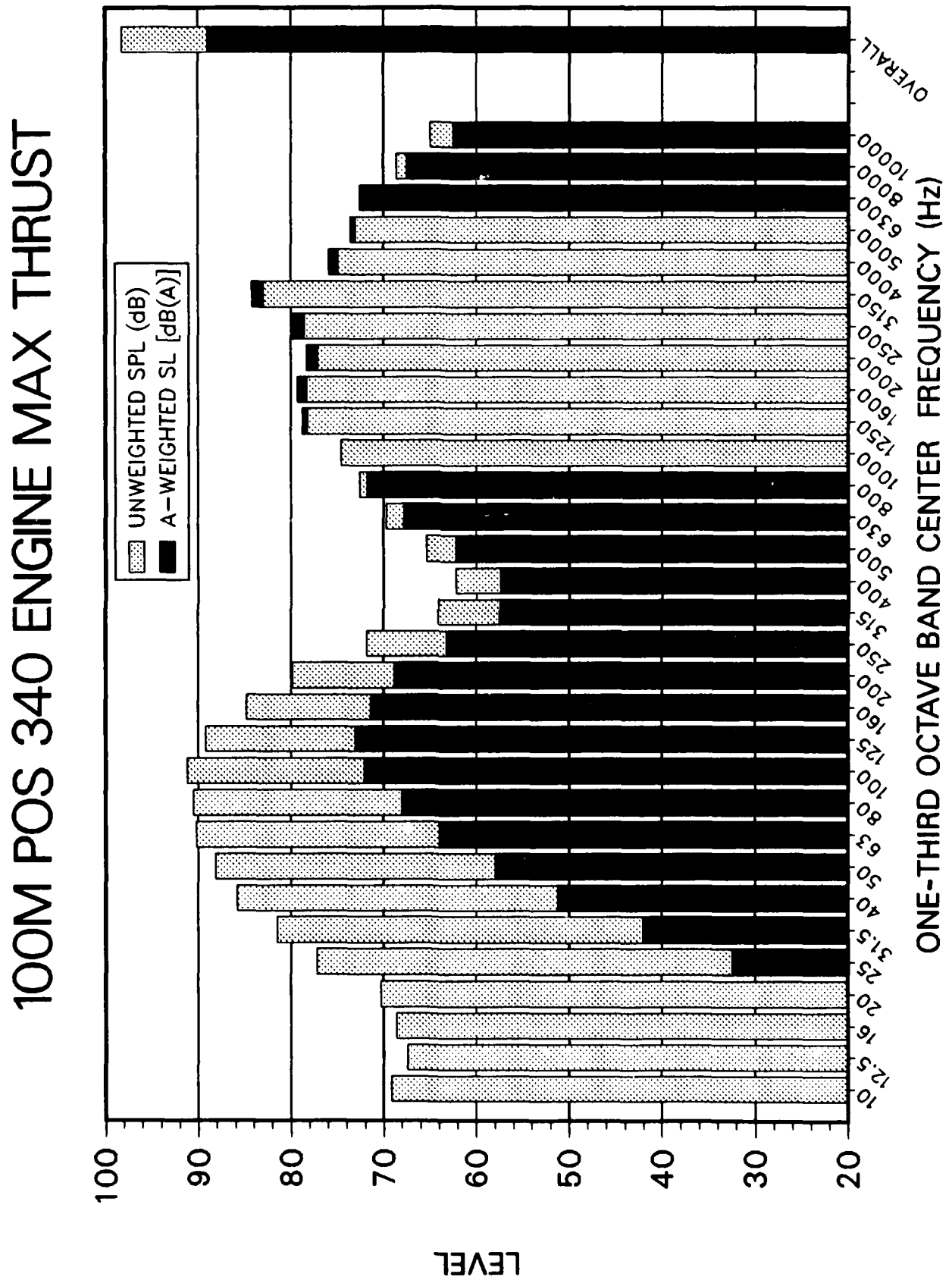
100M POS 340 ENGINE MAX THRUST

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	69.1		0		51.4	
12.5	67.4		4		53.1	
16	68.6	73.7	11.9	20.5	57.4	63.6
20	70.3		19.8		61.8	
25	77.2		32.5		71	
31.5	81.5	87.6	42.1	51.8	77.1	84.1
40	85.8		51.2		82.8	
50	88.2		58		86.2	
63	90.2	94.5	64	69.8	88.9	93.3
80	90.5		68		89.7	
100	91.2		72.1		90.7	
125	89.2	93.9	73.1	77	88.9	93.5
160	84.8		71.4		84.6	
200	79.8		68.9		79.7	
250	71.8	80.5	63.2	70.2	71.8	80.5
315	64.1		57.5		64.1	
400	62.2		57.4		62.2	
500	65.4	71.6	62.2	69.2	65.4	71.6
630	69.7		67.8		69.7	
800	72.6		71.8		72.6	
1,000	74.6	80.5	74.6	80.8	74.6	80.5
1,250	78.2		78.8		78.2	
1,600	78.3		79.3		78.3	
2,000	77.1	82.8	78.3	84	77	82.7
2,500	78.6		79.9		78.4	
3,150	83		84.2		82.7	
4,000	74.9	84	75.9	85.1	74.4	83.6
5,000	73.1		73.6		72.3	
6,300	72.6		72.5		71.3	
8,000	68.6	74.6	67.5	74	66.6	73
10,000	65		62.5		63	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 98.2 dB OASLA = 89 dB(A)

OASLC = 97.2 dB C-A = 8.2 dB


100M POS 340 ENGINE MAX THRUST
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
100
90
80
70
60
50
40
30
20
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
OVERALL
10000
8000
6300
5000
4000
3150
2500
2000
1600
1250
1000
800
630
500
400
315
250
200
160
125
100
80
63
50
40
31.5
25
20
16
12.5
10

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APPENDIX D

DNL and Noise Dosimetry Data

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SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0526
DATA FROM: P1_0626L
06/27/89 10:16:54

Time	0023:59:59
LVL	65.7
SEL	115.1
Lmin	28
Lmax	103.5
Lpk	132
Dose	105.5
Proj	35.0
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	74.5
L10	61
L50	47
L90	42.5

Run date	06/25
Stop date	06/26
Run time 1	00:00
Stop time 1	00:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0526
DATA FROM: P1_0626L 06/27/89 10:16:54

Date 26 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
0:00:01	59.0	94.5	28.0	78.5	128.5	0	0	0	72.0	61.0	51.0	44.0
1:00:01	53.0	88.5	41.5	70.5	125.0	0	0	0	65.0	56.0	48.0	44.0
2:00:01	53.5	89.0	41.0	76.0	128.5	0	0	0	65.0	55.5	45.0	42.0
3:00:01	60.0	95.5	42.0	80.5	132.0	0	0	0	73.0	63.0	51.0	45.0
4:00:01	61.5	97.0	41.5	76.5	127.0	0	0	0	73.5	66.0	53.0	44.0
5:00:01	67.0	102.5	42.0	90.0	130.0	0	0	0	76.0	68.5	57.0	46.5
6:00:01	66.5	102.0	42.5	95.0	129.0	0	0	0	73.0	61.0	50.0	45.0
7:00:01	59.5	95.0	43.0	85.5	125.0	0	0	0	68.0	60.0	50.0	45.0
8:00:01	58.0	93.5	42.0	82.0	115.5	0	0	0	71.5	51.0	44.5	43.0
9:00:01	55.0	90.5	41.0	75.5	109.5	0	0	0	70.5	50.0	43.0	42.0
10:00:01	53.5	89.0	41.0	75.0	109.5	0	0	0	67.0	50.5	44.0	42.0
11:00:01	66.0	101.5	41.5	91.5	116.5	0	0	0	80.0	64.5	51.0	44.0
12:00:01	77.5	113.5	42.0	103.5	128.5	0	0	0	93.0	75.0	56.0	43.5
13:00:01	60.5	96.5	42.0	76.0	109.5	0	0	0	73.5	62.5	54.0	46.0
14:00:01	60.5	96.0	43.5	79.5	109.5	0	0	0	73.0	62.5	55.0	47.0
15:00:01	57.0	92.5	41.5	83.0	122.5	0	0	0	69.0	58.0	47.0	43.0
16:00:01	60.5	96.0	40.5	87.0	112.0	0	0	0	69.5	57.5	49.0	43.5
17:00:01	52.0	88.0	40.5	72.5	109.5	0	0	0	65.5	53.5	46.5	42.5
18:00:01	54.5	90.0	41.5	74.0	109.5	0	0	0	68.0	56.0	46.5	43.0
19:00:01	58.0	93.5	41.5	86.0	109.5	0	0	0	66.0	48.5	44.5	43.0
20:00:01	55.5	91.0	41.5	81.5	109.5	0	0	0	67.0	52.5	45.0	43.0
21:00:01	55.5	91.0	41.0	78.0	109.5	0	0	0	70.5	50.5	44.0	42.5
22:00:01	54.0	89.5	41.0	73.0	109.5	0	0	0	65.0	57.0	42.5	41.5
23:00:01	45.5	81.0	41.5	58.0	109.5	0	0	0	57.0	47.5	43.5	42.0

OVERALL LEQ: 65.2

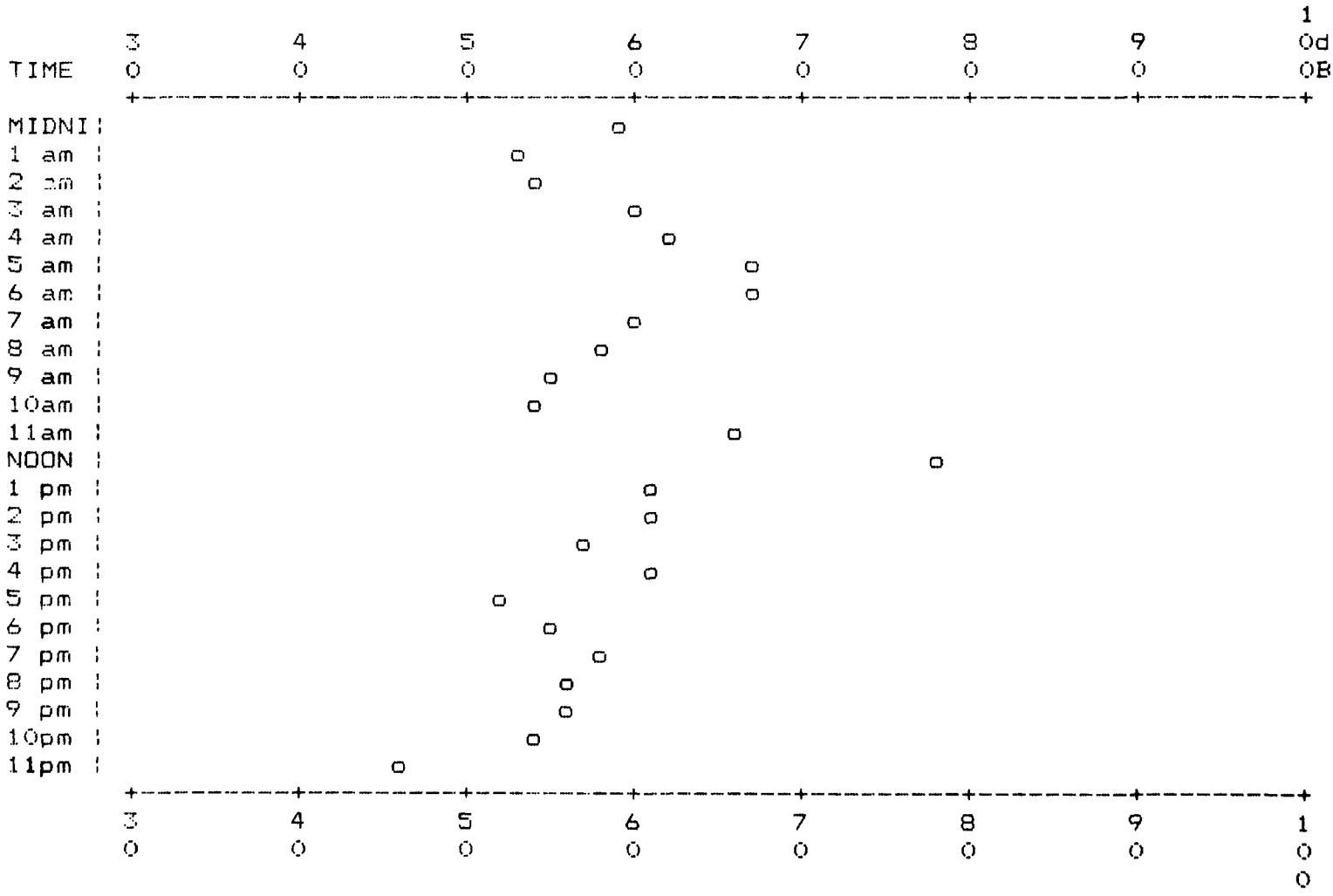
BY:
DATE:
LOCATION:

FROM FILE: P1_0626L

LEQ : o
LMAX : *

L E Q (24) = 65.3
L D N = 69.4
C N E L = 69.5

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0519
DATA FROM: P1_0626A
06/27/89 10:20:11

Time	0023:59:58
LVL	65.4
SEL	114.8
Lmin	27
Lmax	103.5
Lpk	135
Dose	98.3
Proj	32.5
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	74.5
L10	62.5
L50	48
L90	41.5

Run date	06/25
Stop date	06/26
Run time 1	00:00
Stop time 1	00:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0519
DATA FROM: F1_0626A 06/27/89 10:20:11

Date 26 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
0:00:01	41.5	77.0	27.0	55.5	108.5	0	0	0	50.0	41.5	40.5	40.0
1:00:01	50.5	86.0	40.0	68.5	120.5	0	0	0	66.5	51.0	44.5	41.0
2:00:01	55.0	90.5	40.5	67.5	113.0	0	0	0	65.5	59.5	48.0	43.0
3:00:01	61.5	97.0	42.5	70.0	111.0	0	0	0	68.0	65.0	60.0	54.5
4:00:01	59.5	95.0	42.0	69.0	111.0	0	0	0	66.5	63.5	57.5	51.0
5:00:01	68.0	103.5	39.0	89.5	135.0	0	0	0	78.0	70.0	60.0	50.5
6:00:01	65.0	101.0	40.0	93.0	115.5	0	0	0	69.5	65.0	59.0	49.5
7:00:01	63.0	98.5	43.5	85.5	125.5	0	0	0	67.5	65.0	61.0	55.5
8:00:01	62.0	97.5	49.0	82.5	121.5	0	0	0	71.5	63.0	59.5	55.5
9:00:01	55.0	90.5	40.0	75.5	108.5	0	0	0	70.5	55.5	43.0	41.0
10:00:01	52.5	88.0	39.5	74.5	108.5	0	0	0	66.5	49.0	42.5	40.5
11:00:01	66.0	101.5	39.5	91.5	117.0	0	0	0	79.5	63.0	49.0	42.0
12:00:01	77.0	113.0	39.5	103.5	127.0	0	0	0	93.0	74.0	54.5	41.5
13:00:01	59.5	95.0	40.5	75.5	108.5	0	0	0	72.5	61.0	52.5	45.5
14:00:01	59.5	95.0	42.5	80.0	108.5	0	0	0	72.0	62.0	54.0	46.5
15:00:01	56.0	91.5	40.0	83.0	121.5	0	0	0	67.5	57.0	46.5	42.0
16:00:01	60.0	95.5	39.0	87.5	111.0	0	0	0	68.5	56.5	48.0	43.0
17:00:01	51.5	87.0	39.5	71.5	108.5	0	0	0	65.0	52.5	45.5	41.0
18:00:01	53.5	89.0	40.0	73.5	108.5	0	0	0	67.0	54.5	45.0	41.5
19:00:01	57.5	93.0	40.0	85.5	108.5	0	0	0	65.5	47.5	43.0	41.5
20:00:01	55.5	91.0	40.0	82.0	108.5	0	0	0	66.5	51.5	44.0	42.0
21:00:01	55.5	91.0	40.0	79.0	108.5	0	0	0	70.5	50.0	43.0	41.5
22:00:01	54.0	90.0	40.0	73.5	108.5	0	0	0	65.5	57.0	42.0	41.0
23:00:01	45.5	81.0	41.0	58.5	108.5	0	0	0	56.0	47.5	43.0	41.5

OVERALL LEQ: 64.9

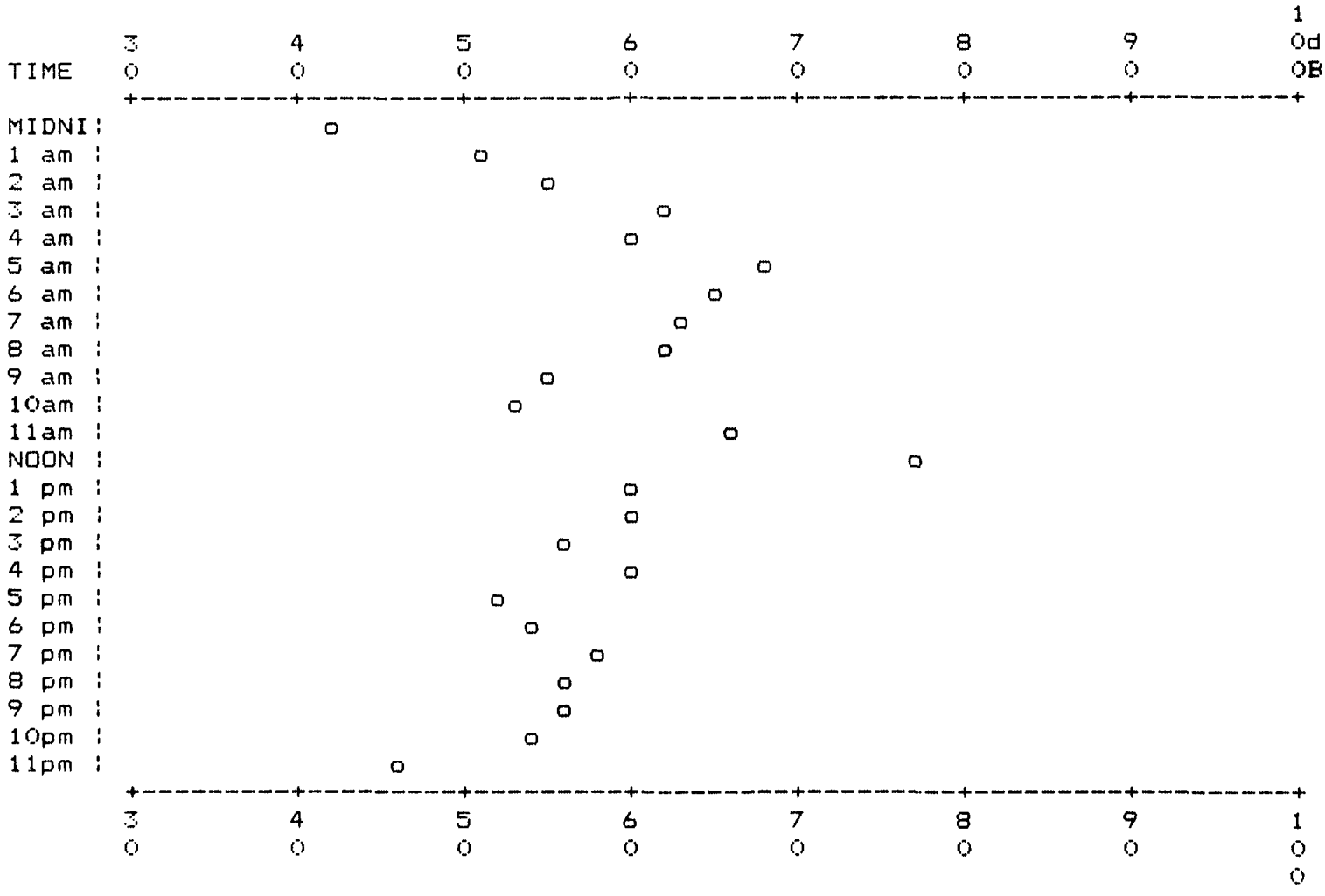
BY:
DATE:
LOCATION:

FROM FILE: P1_0626A

LEQ : o
LMAX : *

L E Q (24)= 65.0
L D N = 69.3
C N E L = 69.4

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0526
DATA FROM: P1_0627L
06/28/89 14:50:38

Time	0023:59:59
LVL	77.6
SEL	127
Lmin	33
Lmax	96.5
Lpk	122.5
Dose	1660.0
Proj	552.0
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	92
L10	67
L50	47
L90	41.5

Run date	06/27
Stop date	06/28
Run time 1	12:00
Stop time 1	12:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0526
DATA FROM: P1_0627L 06/28/89 14:50:38

Date 27 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
12:00:01	85.5	121.5	33.0	95.5	112.5	0	0	0	93.5	91.0	67.5	58.0
13:00:01	64.0	99.5	39.5	82.0	108.0	0	0	0	77.5	63.0	47.5	42.0
14:00:01	66.5	102.0	40.5	88.0	110.5	0	0	0	81.0	63.0	47.5	43.0
15:00:01	84.0	119.5	43.0	96.0	112.5	0	0	0	93.0	91.0	65.0	49.0
16:00:01	87.0	122.5	55.5	96.5	112.5	0	0	0	93.5	92.0	67.0	65.5
17:00:01	74.0	109.5	41.0	92.0	110.5	0	0	0	90.5	64.5	46.5	43.0
18:00:01	67.0	102.5	41.5	92.5	110.5	0	0	0	80.5	60.0	48.0	44.0
19:00:01	53.0	88.5	42.0	73.5	108.0	0	0	0	68.0	51.0	45.0	43.5
20:00:01	63.5	99.0	41.5	91.5	110.5	0	0	0	77.0	51.0	45.5	43.5
21:00:01	47.5	83.0	40.5	71.5	108.0	0	0	0	54.0	46.5	42.5	41.5
22:00:01	45.5	81.0	40.0	66.5	108.0	0	0	0	54.0	47.0	41.5	41.0
23:00:01	60.0	95.5	39.5	84.5	122.5	0	0	0	73.0	53.0	41.5	40.5
0:00:01	49.5	85.0	40.5	74.0	116.5	0	0	0	59.0	49.0	44.0	41.5
1:00:01	44.0	79.5	40.0	56.0	108.0	0	0	0	52.0	46.5	41.5	41.0
2:00:01	42.5	78.0	39.5	56.5	108.0	0	0	0	49.5	44.5	41.0	40.5
3:00:01	41.5	77.0	39.5	47.0	108.0	0	0	0	45.0	42.0	41.5	40.5
4:00:01	45.5	81.0	40.5	70.5	108.0	0	0	0	52.0	44.0	42.5	41.5
5:00:01	54.5	90.0	41.5	80.5	108.0	0	0	0	67.5	50.5	44.5	42.5
6:00:01	59.0	94.5	43.0	79.0	108.0	0	0	0	68.5	62.5	54.5	44.5
7:00:01	58.5	94.0	43.5	73.0	108.0	0	0	0	69.0	61.5	55.0	48.0
8:00:01	63.5	99.0	43.5	86.5	108.0	0	0	0	76.0	62.0	54.5	47.5
9:00:01	82.5	118.0	44.0	96.5	110.5	0	0	0	94.0	79.5	67.0	50.0
10:00:01	67.0	97.5	43.5	84.0	108.0	0	0	0	77.5	60.5	51.0	45.5
11:00:01	64.0	99.5	45.0	83.5	108.0	0	0	0	79.0	64.5	53.5	47.5

OVERALL LEQ: 77.4

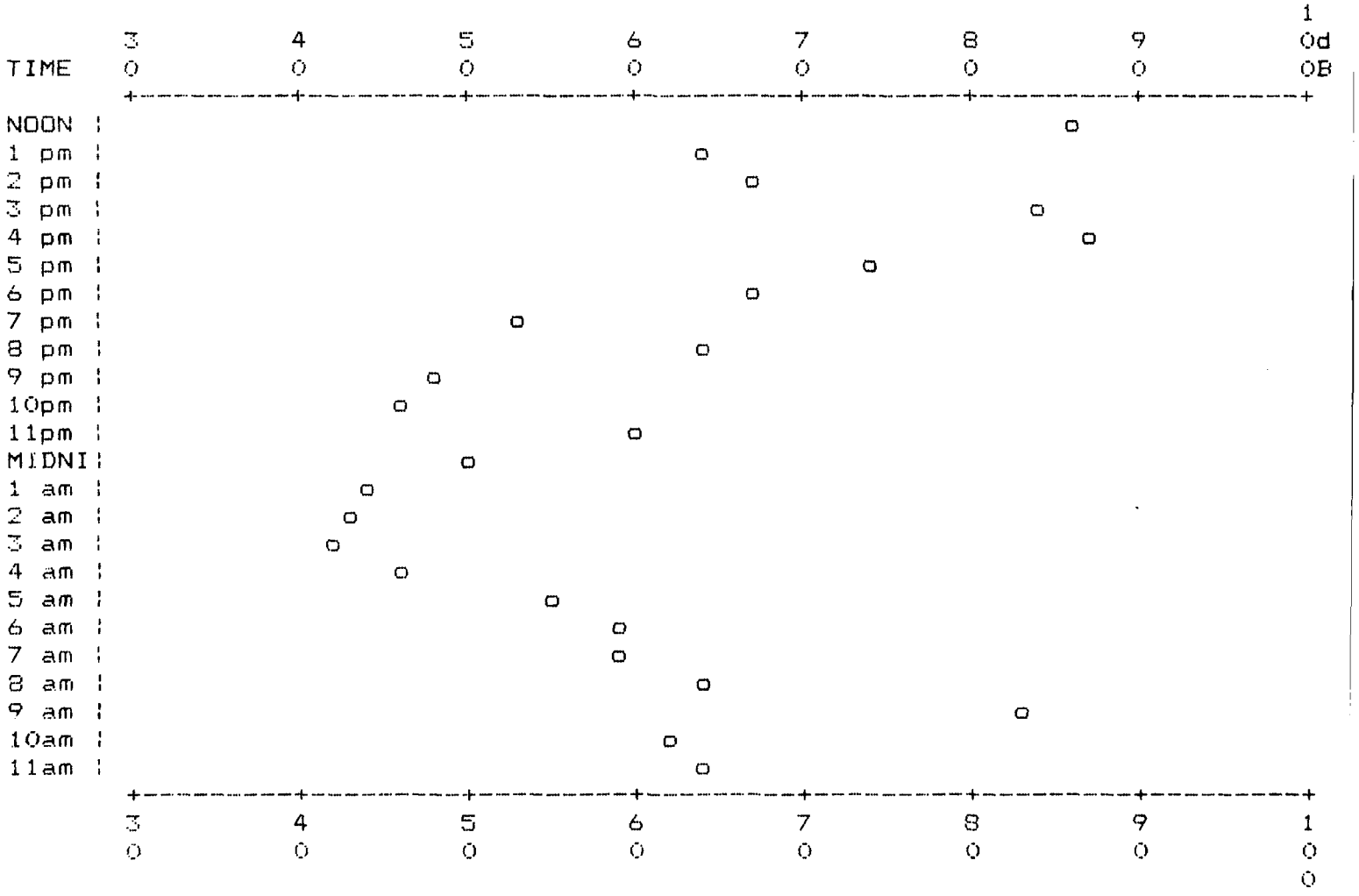
BY:
DATE:
LOCATION:

FROM FILE: P1_0627L

LEQ : o
LMAX : *

L E Q (24) = 77.4
L D N = 77.5
C N E L = 77.6

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0527
DATA FROM: P2_0627L
06/28/89 13:19:49

Time	0023:59:58
LVL	57.9
SEL	107.3
Lmin	25
Lmax	87
Lpk	116
Dose	17.5
Proj	5.8
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	70
L10	59.5
L50	49
L90	39.5

Run date	06/27
Stop date	06/28
Run time 1	12:00
Stop time 1	12:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0527
DATA FROM: P2_0627L 06/28/89 13:19:49

Date 27 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
12:00:01	57.0	92.5	25.0	73.0	106.5	0	0	0	68.5	60.0	52.0	47.5
13:00:01	57.5	93.0	38.5	74.0	106.5	0	0	0	68.0	61.5	52.5	43.0
14:00:01	58.5	94.0	44.0	73.0	106.5	0	0	0	69.0	61.5	55.0	49.5
15:00:01	56.0	92.0	41.0	74.5	106.5	0	0	0	66.5	59.5	53.0	45.5
16:00:01	59.0	94.5	41.0	78.5	106.5	0	0	0	72.0	61.0	54.0	45.0
17:00:01	58.0	93.5	41.0	75.5	106.5	0	0	0	70.0	60.5	52.5	44.5
18:00:01	63.5	99.0	42.5	87.0	109.0	0	0	0	74.5	64.5	57.5	50.5
19:00:01	58.0	94.0	43.5	72.0	106.5	0	0	0	69.0	61.5	54.5	47.5
20:00:01	59.5	95.0	39.5	81.0	106.5	0	0	0	75.5	53.5	46.0	42.0
21:00:01	47.0	82.5	38.0	66.5	106.5	0	0	0	58.5	48.5	42.5	39.5
22:00:01	43.0	78.5	37.0	56.0	106.5	0	0	0	53.5	46.5	40.0	38.5
23:00:01	55.5	91.0	36.5	77.5	116.0	0	0	0	68.5	57.5	39.5	38.0
0:00:01	52.0	87.5	38.0	70.5	112.5	0	0	0	62.0	55.5	47.5	39.5
1:00:01	44.5	80.0	38.0	56.5	106.5	0	0	0	54.0	48.0	40.5	39.0
2:00:01	42.0	77.5	37.0	58.5	106.5	0	0	0	51.5	43.5	39.5	38.0
3:00:01	41.0	76.5	38.0	47.5	106.5	0	0	0	45.0	42.5	40.5	39.0
4:00:01	45.5	81.0	39.5	68.0	106.5	0	0	0	53.5	45.0	42.5	41.0
5:00:01	52.0	87.5	41.0	76.0	106.5	0	0	0	64.0	50.0	45.0	43.0
6:00:01	54.5	90.0	43.0	68.5	106.5	0	0	0	64.0	57.0	52.0	45.0
7:00:01	57.0	92.5	45.0	70.0	106.5	0	0	0	64.0	60.5	55.0	48.0
8:00:01	56.0	91.5	45.0	71.0	106.5	0	0	0	66.0	59.5	53.0	47.0
9:00:01	63.0	98.5	44.0	85.5	106.5	0	0	0	75.5	65.0	52.5	48.0
10:00:01	58.5	94.0	43.0	78.0	106.5	0	0	0	73.5	57.5	50.5	46.5
11:00:01	63.5	99.0	44.0	78.0	106.5	0	0	0	75.0	68.0	54.0	47.0

OVERALL LEQ: 57.7

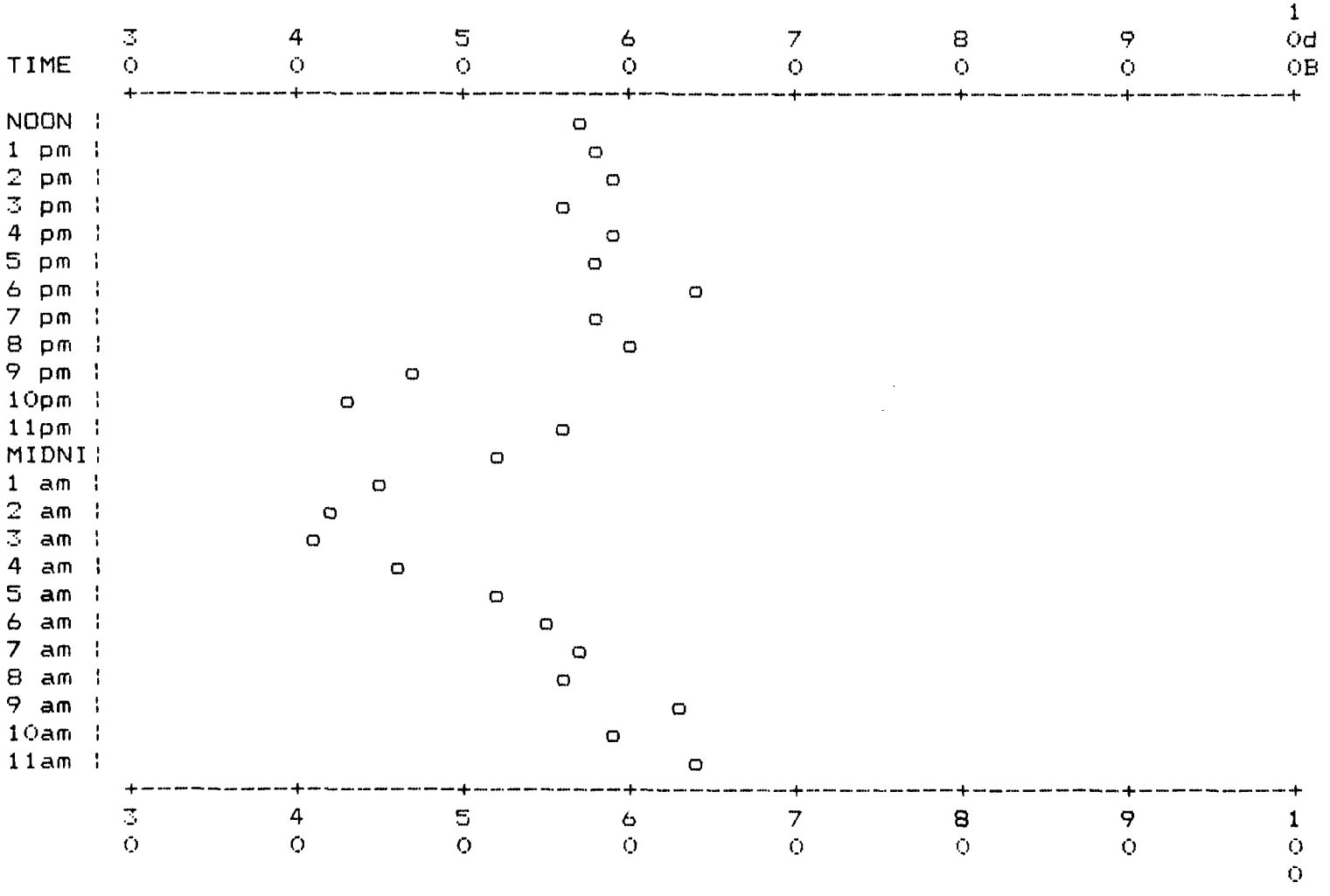
BY:
DATE:
LOCATION:

FROM FILE: P2_0627L

LEQ : o
LMAX : *

L E Q (24)= 57.8
L D N = 60.7
C N E L = 61.2

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0527
DATA FROM: P2_0628L
07/01/89 12:48:15

Time	0023:59:59
LVL	59.7
SEL	109.1
Lmin	31.5
Lmax	91.5
Lpk	114
Dose	26.7
Proj	8.9
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	72
L10	60.5
L50	49
L90	41

Run date	06/28
Stop date	06/29
Run time 1	15:00
Stop time 1	15:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0527
DATA FROM: P2_0628L 07/01/89 12:48:15

Date 28 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
15:00:01	60.0	95.5	31.5	79.0	108.0	0	0	0	87.0	64.5	56.0	50.5
16:00:01	58.5	94.0	41.5	70.5	108.0	0	0	0	67.0	63.0	55.5	47.0
17:00:01	55.0	90.5	40.0	71.0	108.0	0	0	0	66.5	58.5	49.0	43.5
18:00:01	60.5	96.0	40.5	87.0	110.5	0	0	0	71.5	61.0	50.5	44.0
19:00:01	65.5	101.0	43.5	80.5	110.5	0	0	0	78.0	69.0	57.0	49.5
20:00:01	59.0	94.5	40.5	74.0	108.0	0	0	0	68.0	63.5	56.0	46.5
21:00:01	64.5	100.5	41.5	80.5	108.0	0	0	0	77.0	69.0	51.5	44.5
22:00:01	48.0	83.5	39.5	67.0	108.0	0	0	0	59.0	50.5	43.5	41.5
23:00:01	48.0	84.0	40.0	68.5	108.0	0	0	0	59.0	50.5	43.5	41.5
0:00:01	48.0	83.5	38.0	66.0	108.0	0	0	0	61.5	50.0	41.5	39.5
1:00:01	44.5	80.0	37.5	64.5	108.0	0	0	0	57.0	45.5	40.5	39.0
2:00:01	47.0	82.5	37.5	65.0	108.0	0	0	0	59.0	50.0	40.0	38.5
3:00:01	47.0	83.0	37.5	69.0	108.0	0	0	0	59.0	48.0	40.5	39.0
4:00:01	63.5	99.0	38.5	91.5	112.5	0	0	0	64.5	54.5	48.0	40.0
5:00:01	63.0	99.0	40.5	89.5	108.0	0	0	0	74.5	52.5	44.5	42.5
6:00:01	51.5	87.0	42.0	72.5	108.0	0	0	0	63.5	53.0	47.5	45.0
7:00:01	47.5	83.5	41.0	64.5	108.0	0	0	0	58.0	49.5	45.5	43.5
8:00:01	56.5	92.0	43.0	69.0	110.5	0	0	0	64.5	61.0	54.0	46.5
9:00:01	59.5	95.0	43.0	75.0	108.0	0	0	0	72.0	62.5	52.5	46.5
10:00:01	61.5	97.0	46.5	76.5	108.0	0	0	0	72.0	65.0	57.5	52.0
11:00:01	58.5	94.0	46.0	78.5	108.0	0	0	0	71.0	60.5	52.5	49.0
12:00:01	59.0	95.0	43.5	86.0	114.0	0	0	0	73.0	58.0	49.0	45.5
13:00:01	61.0	96.5	44.0	89.5	110.5	0	0	0	68.5	57.5	50.5	47.5
14:00:01	57.5	93.0	42.5	75.5	108.0	0	0	0	70.5	60.0	52.0	47.0

OVERALL LEQ: 59.4

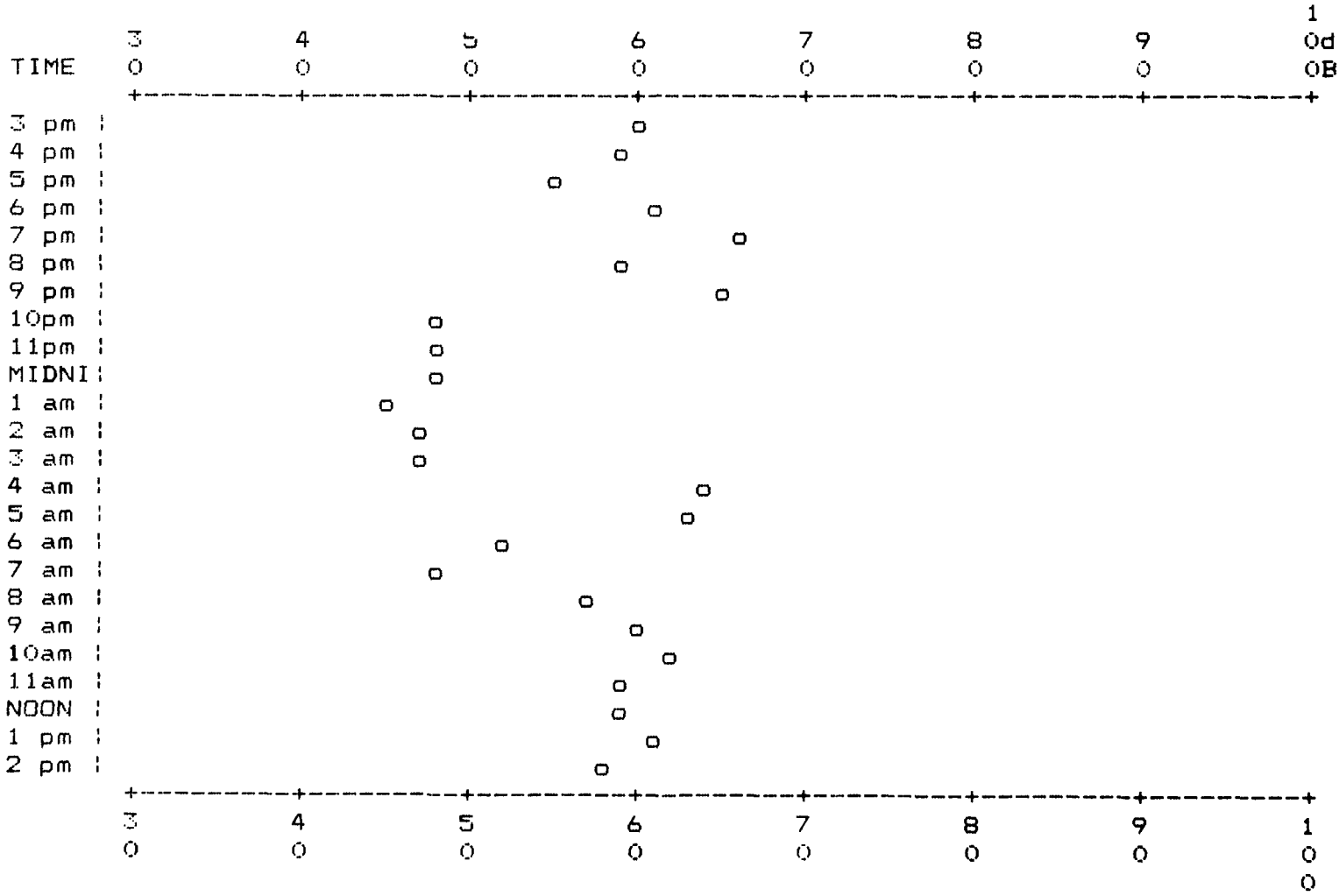
BY:
DATE:
LOCATION:

FROM FILE: P2_0628L

LEQ : o
LMAX : *

L E Q (24) = 59.4
L D N = 64.3
C N E L = 65.2

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0528
DATA FROM: P3_0626L
06/27/89 11:11:00

Time	0023:59:59
LVL	56
SEL	105.4
Lmin	27.5
Lmax	87
Lpk	123
Dose	11.4
Proj	3.8
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	67
L10	53.5
L50	47
L90	41

Run date	06/25
Stop date	06/26
Run time 1	00:00
Stop time 1	00:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	0.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0528
DATA FROM: P3_0626L 06/27/89 11:11:00

Date 26 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
0:00:01	41.5	77.0	27.5	48.5	99.5	0	0	0	46.5	43.0	41.0	40.0
1:00:01	48.0	83.5	40.5	68.5	99.5	0	0	0	57.0	48.5	46.5	43.0
2:00:01	49.5	85.0	46.0	57.5	99.5	0	0	0	55.5	50.0	49.0	48.0
3:00:01	56.5	92.0	47.5	86.5	99.5	0	0	0	58.5	52.0	50.5	49.0
4:00:01	51.5	87.0	49.5	56.5	99.5	0	0	0	55.0	51.5	51.0	50.5
5:00:01	65.0	100.5	49.0	83.5	99.5	0	0	0	80.5	63.5	52.5	50.5
6:00:01	55.5	91.0	50.0	81.5	99.5	0	0	0	64.5	53.0	51.5	51.0
7:00:01	54.0	89.5	50.0	72.0	99.5	0	0	0	62.5	54.5	53.0	51.0
8:00:01	56.0	91.5	40.0	74.5	123.0	0	0	0	67.5	57.0	53.0	47.0
9:00:01	55.0	90.5	48.0	79.5	105.5	0	0	0	65.0	53.5	50.5	49.5
10:00:01	51.5	87.0	39.5	72.5	105.5	0	0	0	65.0	51.0	47.5	43.5
11:00:01	59.0	94.5	39.3	77.5	105.5	0	0	0	73.0	58.5	48.5	42.5
12:00:01	59.5	95.0	36.5	87.0	105.5	0	0	0	73.0	53.5	43.0	39.0
13:00:01	52.5	88.5	36.0	79.0	105.5	0	0	0	66.5	50.0	42.5	38.5
14:00:01	51.5	87.0	37.5	73.0	105.5	0	0	0	66.0	52.0	42.5	39.5
15:00:01	51.0	86.5	38.0	70.5	105.5	0	0	0	64.5	51.0	43.0	40.0
16:00:01	53.5	89.0	38.0	76.5	109.0	0	0	0	67.5	53.0	45.5	41.0
17:00:01	48.5	84.0	38.5	68.5	105.5	0	0	0	58.0	50.5	44.5	41.5
18:00:01	52.0	87.5	39.5	81.0	105.5	0	0	0	64.0	52.0	45.0	42.5
19:00:01	54.0	89.5	39.5	80.0	109.0	0	0	0	61.5	49.0	44.0	41.5
20:00:01	56.5	92.0	38.5	83.5	99.5	0	0	0	71.0	51.5	44.0	41.0
21:00:01	56.5	92.0	38.0	83.5	99.5	0	0	0	65.0	49.0	43.5	41.0
22:00:01	49.0	84.5	40.0	67.5	99.5	0	0	0	58.5	53.5	43.5	42.0
23:00:01	49.5	85.0	39.5	75.5	99.5	0	0	0	62.0	50.5	44.5	42.5

OVERALL LEQ: 55.8

```
        BY:                                                  LEQ    :  o
      DATE:                    FROM FILE: P3_0626L           LMAX   :  *
  LOCATION:
 L E Q (24)=  55.9
 L D N     =  63.3
 C N E L   =  63.5              24 HOURLY SAMPLES

                                                                                  1
        3         4         5         6         7         8         9          0d
TIME    0         0         0         0         0         0         0          0B
        +---------+---------+---------+---------+---------+---------+---------+
MIDNI   |                   o
1 am    |                     o
2 am    |                       o
3 am    |                           o
4 am    |                         o
5 am    |                                   o
6 am    |                             o
7 am    |                           o
8 am    |                             o
9 am    |                            o
10am    |                         o
11am    |                                 o
NOON    |                                  o
1 pm    |                          o
2 pm    |                         o
3 pm    |                        o
4 pm    |                           o
5 pm    |                       o
6 pm    |                         o
7 pm    |                           o
8 pm    |                               o
9 pm    |                               o
10pm    |                       o
11pm    |                        o
        +---------+---------+---------+---------+---------+---------+---------+
        3         4         5         6         7         8         9          1
        0         0         0         0         0         0         0          0
                                                                               0
```

SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0528
DATA FROM: P3_0628L
07/01/89 12:45:00

Time	0023:59:59
LVL	66.1
SEL	115.4
Lmin	38
Lmax	104.5
Lok	128
Dose	115.8
Proj	38.6
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	75
L10	59
L50	49.5
L90	42

Run date	06/28
Stop date	06/29
Run time 1	16:00
Stop time 1	16:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	80
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	9.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0528
DATA FROM: P3_0628L 07/01/89 12:45:00

Date 28 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
16:00:01	55.0	90.5	41.0	77.0	98.5	0	0	0	68.0	53.5	46.5	43.0
17:00:01	47.0	82.5	39.5	69.0	104.5	0	0	0	58.5	47.5	44.0	41.5
18:00:01	48.0	83.5	38.0	66.0	104.5	0	0	0	61.5	49.0	42.0	40.0
19:00:01	59.0	95.0	38.0	90.0	104.5	0	0	0	66.5	61.0	46.0	41.0
20:00:01	55.5	91.0	38.5	86.0	98.5	0	0	0	65.5	51.0	43.5	40.5
21:00:01	57.0	92.5	39.0	74.5	98.5	0	0	0	68.5	61.5	46.0	41.0
22:00:01	48.5	84.0	38.5	77.0	98.5	0	0	0	57.0	49.0	42.0	40.5
23:00:01	47.0	82.5	39.5	71.0	98.5	0	0	0	58.0	48.0	43.0	41.5
0:00:01	47.0	82.5	40.5	69.5	98.5	0	0	0	59.5	45.5	43.5	42.0
1:00:01	47.0	82.5	41.0	72.0	98.5	0	0	0	56.5	46.0	44.0	43.0
2:00:01	49.0	84.5	42.5	70.5	98.5	0	0	0	58.5	52.0	45.5	44.0
3:00:01	51.0	87.0	45.5	63.0	98.5	0	0	0	59.0	51.5	50.5	47.5
4:00:01	52.0	87.5	47.0	73.5	98.5	0	0	0	59.5	54.5	48.5	47.5
5:00:01	56.0	91.5	47.0	77.5	98.5	0	0	0	68.5	55.5	50.5	49.0
6:00:01	53.0	88.5	48.0	70.5	98.5	0	0	0	63.0	54.5	51.0	49.5
7:00:01	55.0	90.5	47.5	78.5	98.5	0	0	0	64.5	55.0	51.5	49.5
8:00:01	58.5	94.0	48.5	71.5	98.5	0	0	0	67.5	62.0	56.0	51.0
9:00:01	63.5	99.0	49.0	89.5	104.5	0	0	0	75.0	63.0	54.5	51.0
10:00:01	79.0	114.5	47.0	104.5	128.0	0	0	0	93.0	78.0	61.0	50.5
11:00:01	62.5	98.0	44.5	88.0	104.5	0	0	0	75.5	63.0	52.0	49.0
12:00:01	67.0	102.5	46.0	87.5	104.5	0	0	0	79.0	70.0	58.0	49.0
13:00:01	54.5	90.0	44.5	75.0	104.5	0	0	0	66.5	56.0	50.5	47.5
14:00:01	55.5	91.0	45.0	75.0	104.5	0	0	0	67.0	57.5	51.0	48.0
15:00:01	56.5	92.5	44.0	78.0	104.5	0	0	0	69.0	58.5	51.0	47.5

OVERALL LEQ: 65.9

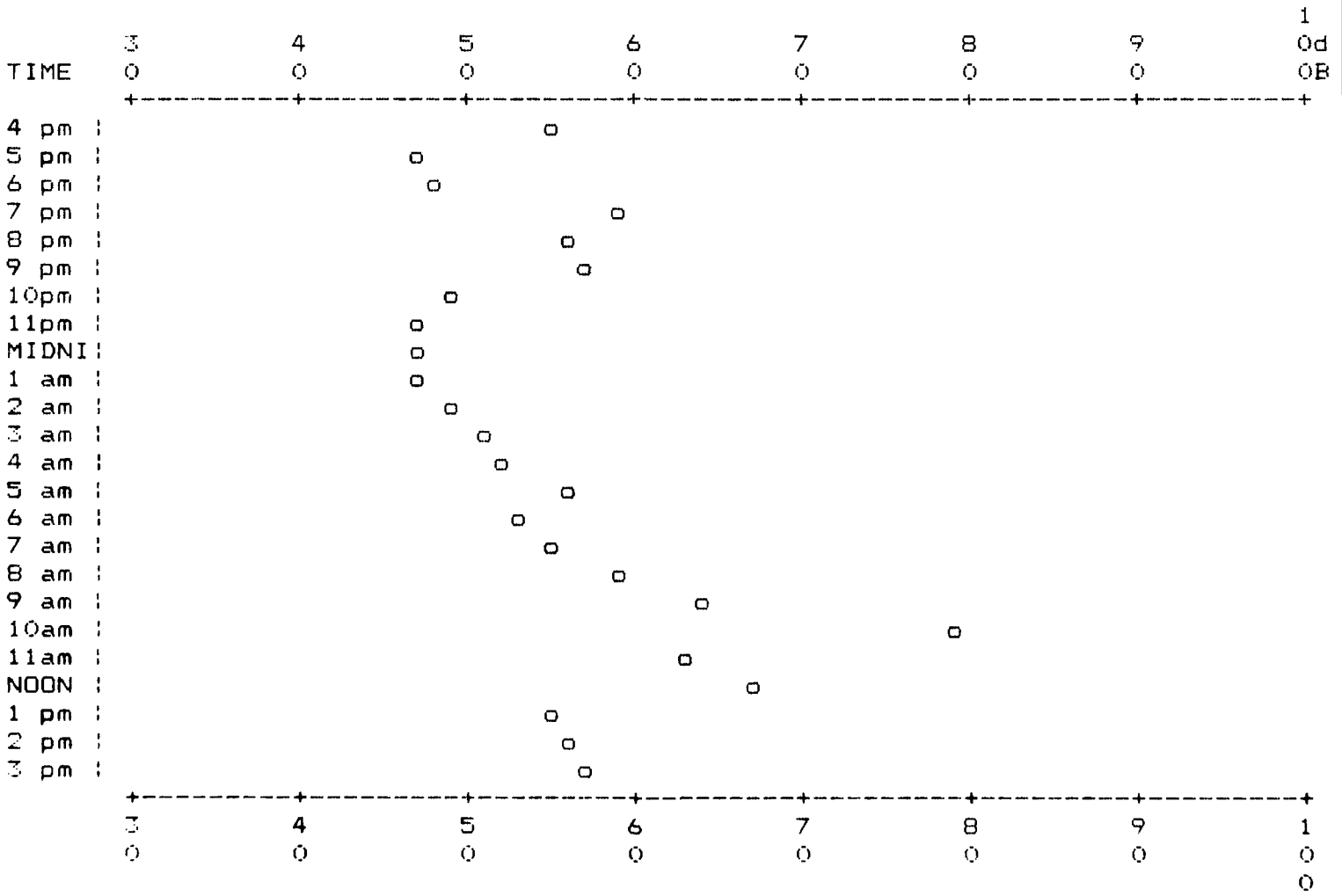
BY:
DATE:
LOCATION:

FROM FILE: P3_0628L

LEQ : o
LMAX : *

L E Q (24)= 65.9
L D N = 66.5
C N E L = 66.6

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0529
DATA FROM: P4_0626L
06/27/89 09:41:47

Time	0023:59:59
LVL	60
SEL	109.4
Lmin	29
Lmax	100
Lok	126.5
Dose	28.8
Proj	9.6
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	70
L10	56
L50	45.5
L90	40.5

Run date	06/25
Stop date	06/26
Run time 1	00:00
Stop time 1	00:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0529
DATA FROM: P4_0626L 06/27/89 09:41:47

Date 26 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
0:00:01	41.0	76.5	29.0	51.5	110.5	0	0	0	49.0	42.5	39.5	38.0
1:00:01	46.5	82.0	37.5	71.5	110.5	0	0	0	57.5	46.0	40.0	39.0
2:00:01	46.5	82.5	37.5	71.0	125.5	0	0	0	57.0	46.0	41.0	39.5
3:00:01	51.0	86.5	38.5	81.5	116.5	0	0	0	58.5	51.0	41.5	40.5
4:00:01	49.5	85.0	38.0	70.0	120.0	0	0	0	59.0	51.5	46.5	39.5
5:00:01	64.5	100.0	38.0	88.5	126.5	0	0	0	78.0	53.0	45.0	40.5
6:00:01	66.0	101.5	42.0	94.0	116.5	0	0	0	75.0	56.5	46.0	44.0
7:00:01	59.0	95.0	43.5	84.0	110.5	0	0	0	71.5	60.0	47.5	45.5
8:00:01	58.5	94.0	43.5	80.5	110.5	0	0	0	68.0	60.5	53.0	46.0
9:00:01	64.5	100.0	42.5	92.0	110.5	0	0	0	76.0	52.0	45.5	44.0
10:00:01	66.5	102.0	41.5	100.0	117.5	0	0	0	73.5	55.5	45.0	43.0
11:00:01	63.5	99.0	39.0	82.5	113.0	0	0	0	78.5	64.5	48.5	42.5
12:00:01	60.0	95.5	38.5	79.5	110.5	0	0	0	75.0	59.5	47.0	40.5
13:00:01	55.0	90.5	39.5	76.5	110.5	0	0	0	68.0	56.0	48.5	44.5
14:00:01	57.0	92.5	40.5	77.5	110.5	0	0	0	70.5	57.5	49.5	45.0
15:00:01	55.5	91.0	40.5	76.5	110.5	0	0	0	68.5	56.5	48.5	43.5
16:00:01	61.0	96.5	40.0	84.0	110.5	0	0	0	75.5	58.0	49.5	43.5
17:00:01	51.5	87.0	40.0	71.5	110.5	0	0	0	63.0	53.0	44.5	42.5
18:00:01	54.0	89.5	40.5	70.5	110.5	0	0	0	65.5	56.0	46.5	43.0
19:00:01	52.5	88.0	37.0	76.0	110.5	0	0	0	64.5	52.0	44.0	41.5
20:00:01	57.0	92.5	38.5	84.0	110.5	0	0	0	70.0	53.5	46.0	41.0
21:00:01	55.5	91.0	37.5	79.5	110.5	0	0	0	68.0	50.0	43.0	40.0
22:00:01	55.0	90.5	39.0	71.5	110.5	0	0	0	67.5	60.5	44.5	40.5
23:00:01	50.0	85.5	40.0	74.5	110.5	0	0	0	65.0	52.0	44.0	41.0

OVERALL LEQ: 59.8

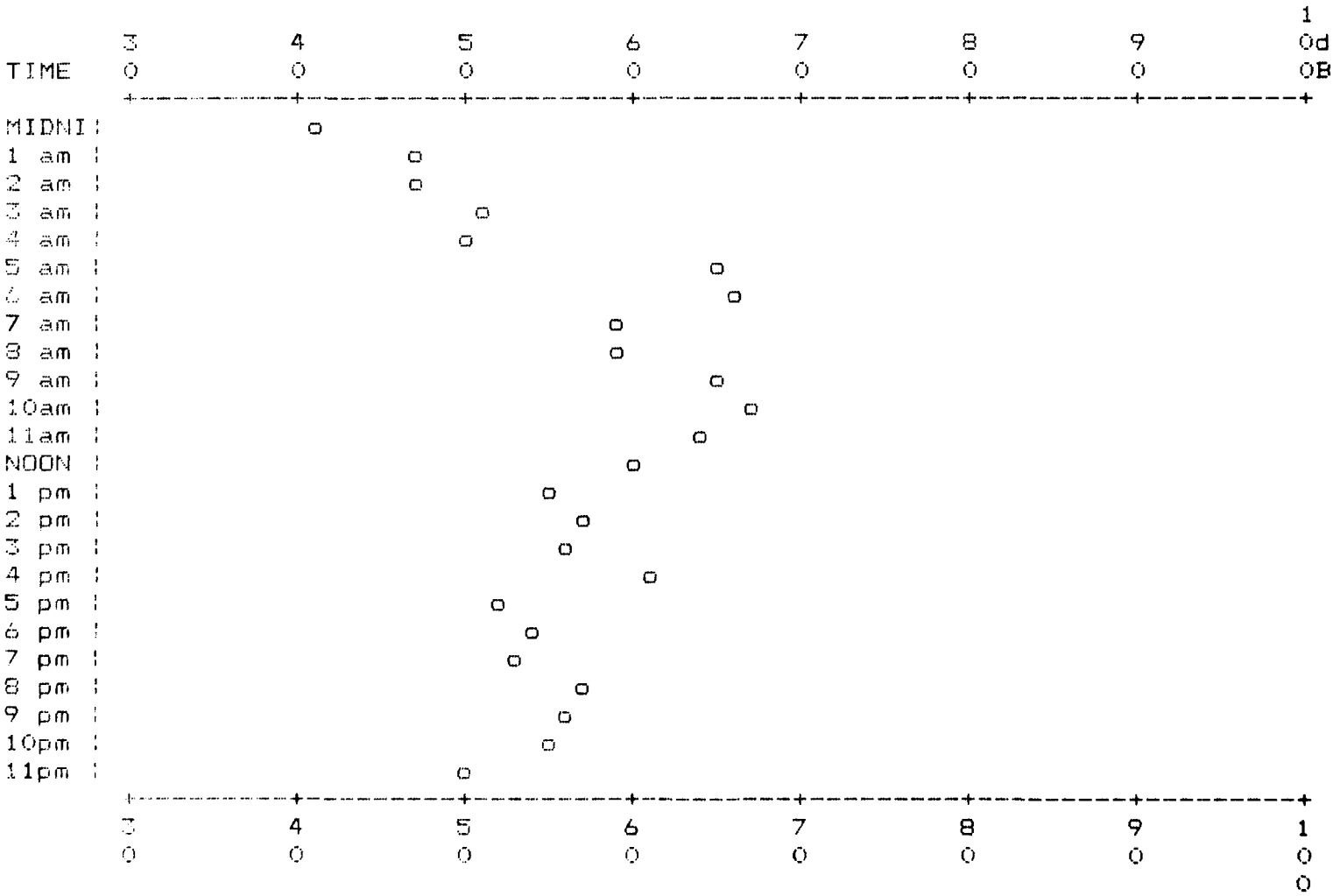
BY:
DATE:
LOCATION:

FROM FILE: P4_0626L

LEQ : o
LMAX : *

L E Q (24) = 59.9
L D N = 66.1
C N E L = 66.2

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0529
DATA FROM: P4_0627L
06/28/89 13:58:48

Time	0023:59:59
LVL	66.2
SEL	115.6
Lmin	37.5
Lmax	96.5
Lpk	116.5
Dose	119.3
Proj	39.6
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	79
L10	64.5
L50	49.5
L90	41

Run date	06/27
Stop date	06/28
Run time 1	12:00
Stop time 1	12:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0529
DATA FROM: P4_0627L 06/28/89 13:58:48

Date 27 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
12:00:01	69.5	105.0	41.5	86.5	112.0	0	0	0	79.5	74.5	60.0	51.5
13:00:01	67.5	103.0	42.0	86.5	112.0	0	0	0	82.5	63.5	50.0	46.0
14:00:01	70.0	105.5	41.5	88.5	112.0	0	0	0	86.0	64.5	53.0	48.0
15:00:01	68.5	104.0	46.0	83.0	109.5	0	0	0	79.5	74.0	58.0	50.5
16:00:01	72.5	108.0	45.5	87.0	112.0	0	0	0	82.0	77.0	62.5	57.0
17:00:01	60.0	95.5	41.0	81.0	109.5	0	0	0	74.5	60.0	47.5	43.5
18:00:01	65.5	101.0	41.5	89.0	109.5	0	0	0	79.5	64.0	51.5	45.5
19:00:01	57.5	89.0	40.0	75.5	109.5	0	0	0	66.5	53.5	44.5	42.0
20:00:01	65.0	100.5	41.5	88.5	109.5	0	0	0	79.0	56.0	47.0	44.0
21:00:01	48.0	84.0	39.0	73.0	109.5	0	0	0	60.0	47.5	42.5	40.5
22:00:01	49.0	84.5	38.0	73.5	109.5	0	0	0	59.5	50.5	41.0	39.5
23:00:01	59.5	95.5	37.5	84.0	116.5	0	0	0	70.5	58.0	41.0	39.0
00:00:01	57.0	92.5	40.0	73.0	114.0	0	0	0	68.0	60.5	50.0	42.5
01:00:01	45.5	81.0	39.0	63.5	109.5	0	0	0	57.0	48.0	41.5	40.0
02:00:01	46.5	82.0	38.5	72.0	109.5	0	0	0	57.0	48.0	41.0	39.5
03:00:01	41.0	76.5	39.0	47.0	109.5	0	0	0	44.0	42.0	41.0	40.0
04:00:01	46.5	84.0	39.5	74.5	109.5	0	0	0	61.0	45.0	42.5	41.0
05:00:01	56.5	92.0	42.5	78.5	109.5	0	0	0	70.0	55.5	46.5	43.5
06:00:01	58.0	93.5	44.0	78.0	109.5	0	0	0	70.5	61.0	50.5	47.5
07:00:01	74.0	109.5	46.5	96.5	116.5	0	0	0	88.0	72.5	54.0	49.5
08:00:01	59.0	94.5	46.5	80.0	109.5	0	0	0	72.0	60.5	52.0	48.0
09:00:01	64.0	101.5	49.0	87.0	109.5	0	0	0	80.0	65.0	57.5	52.5
10:00:01	63.5	99.0	47.0	84.0	109.5	0	0	0	79.0	63.5	53.0	50.0
11:00:01	67.5	103.0	47.0	86.5	112.0	0	0	0	81.0	70.5	55.0	50.0

OVERALL LEQ: 66.1

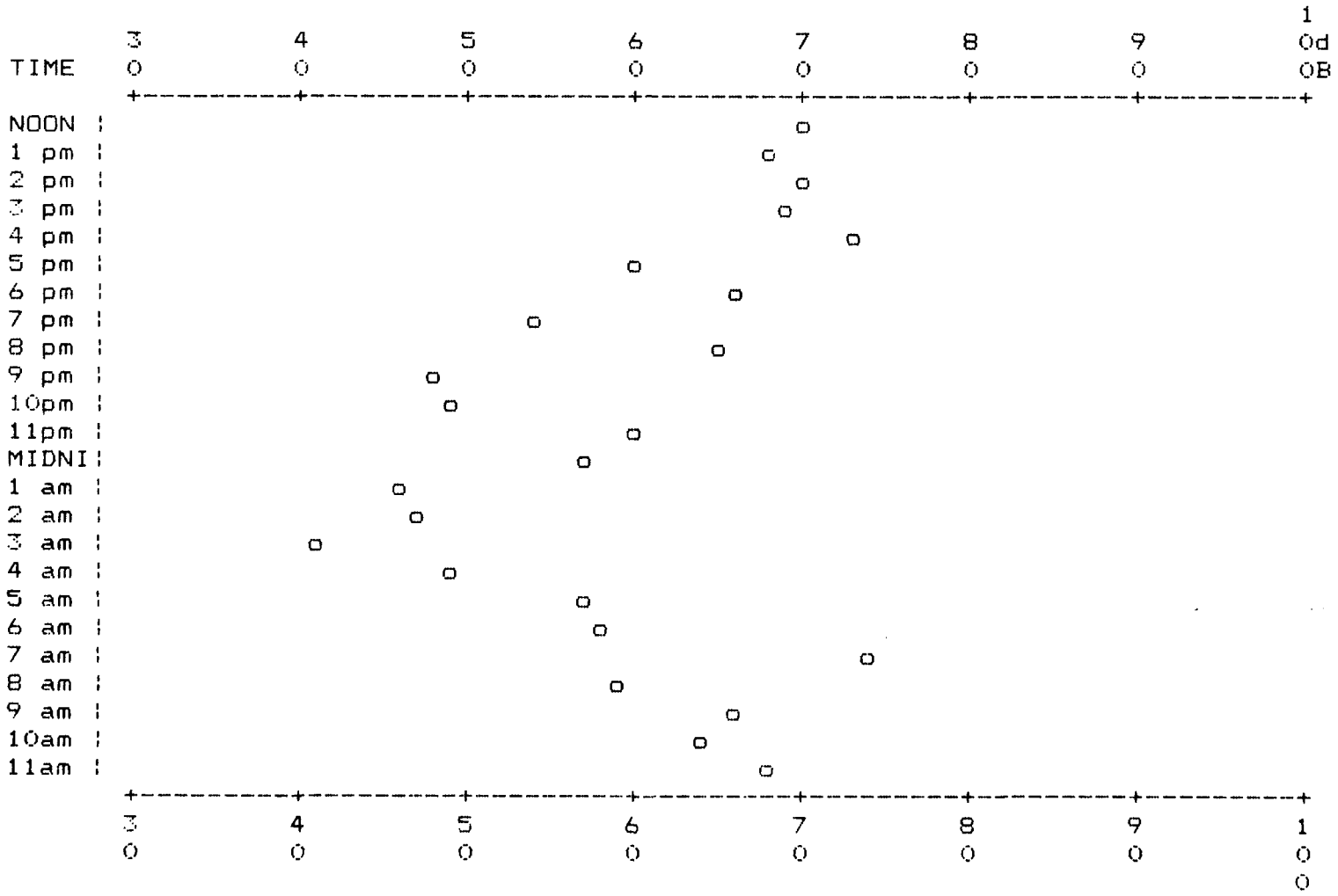
BY:
DATE:
LOCATION:

FROM FILE: P4_0627L

LEQ : o
LMAX : *

L E Q (24)= 66.1
L D N = 71.6
C N E L = 71.7

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0529
DATA FROM: P4_0628L
07/01/89 12:50:55

Time	0023:59:59
LVL	64.1
SEL	113.4
Lmin	39
Lmax	88.5
Lpk	113
Dose	72.5
Proj	24.2
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	77
L10	66.5
L50	50.5
L90	42.5

Run date	06/28
Stop date	06/29
Run time 1	16:00
Stop time 1	16:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0529
DATA FROM: P4_0628L 07/01/89 12:50:55

Date 28 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
16:00:01	56.0	91.5	42.0	79.0	110.5	0	0	0	89.5	59.5	48.0	45.0
17:00:01	54.5	90.0	39.5	78.0	110.5	0	0	0	67.5	55.5	48.0	42.5
18:00:01	57.5	93.0	39.0	83.5	110.5	0	0	0	71.0	54.5	43.0	40.5
19:00:01	67.0	102.5	40.5	85.0	110.5	0	0	0	80.5	70.5	53.5	43.5
20:00:01	56.5	92.0	39.5	86.5	110.5	0	0	0	66.0	55.5	45.0	41.5
21:00:01	67.5	103.0	41.0	84.0	110.5	0	0	0	80.0	71.5	51.5	45.0
22:00:01	51.5	87.0	41.0	72.0	110.5	0	0	0	64.0	53.5	44.5	42.0
23:00:01	51.0	87.0	41.5	74.0	110.5	0	0	0	64.0	52.0	44.5	43.0
0:00:01	48.0	83.5	39.5	67.5	110.5	0	0	0	62.0	47.5	43.5	42.0
1:00:01	49.0	84.5	39.5	79.0	110.5	0	0	0	58.5	46.0	43.0	41.0
2:00:01	50.0	85.5	39.0	74.5	110.5	0	0	0	62.0	52.5	42.0	40.5
3:00:01	50.5	86.0	39.5	77.0	110.5	0	0	0	63.0	50.0	43.0	41.0
4:00:01	60.0	95.5	41.0	86.0	110.5	0	0	0	68.0	58.0	48.5	42.5
5:00:01	60.0	95.5	42.0	86.0	110.5	0	0	0	66.0	53.5	47.0	44.0
6:00:01	57.5	93.0	46.0	77.5	110.5	0	0	0	71.0	59.0	50.0	48.0
7:00:01	59.5	95.0	47.5	77.5	110.5	0	0	0	73.5	60.0	52.5	49.5
8:00:01	70.5	106.0	50.0	83.5	113.0	0	0	0	80.5	75.0	66.5	54.5
9:00:01	68.0	103.5	48.5	88.5	113.0	0	0	0	79.0	71.5	59.5	54.0
10:00:01	69.5	105.0	50.0	82.0	110.5	0	0	0	78.0	74.0	63.5	53.5
11:00:01	66.0	101.5	47.0	88.0	113.0	0	0	0	77.0	69.5	57.0	51.5
12:00:01	62.5	98.0	46.5	83.5	113.0	0	0	0	75.5	63.5	55.5	51.0
13:00:01	65.0	100.5	47.5	84.0	113.0	0	0	0	75.5	68.5	58.0	51.0
14:00:01	66.5	102.0	46.0	84.5	113.0	0	0	0	79.5	68.5	58.5	51.0
15:00:01	64.0	99.5	46.5	87.5	113.0	0	0	0	75.5	67.0	56.0	51.0

OVERALL LEQ: 63.8

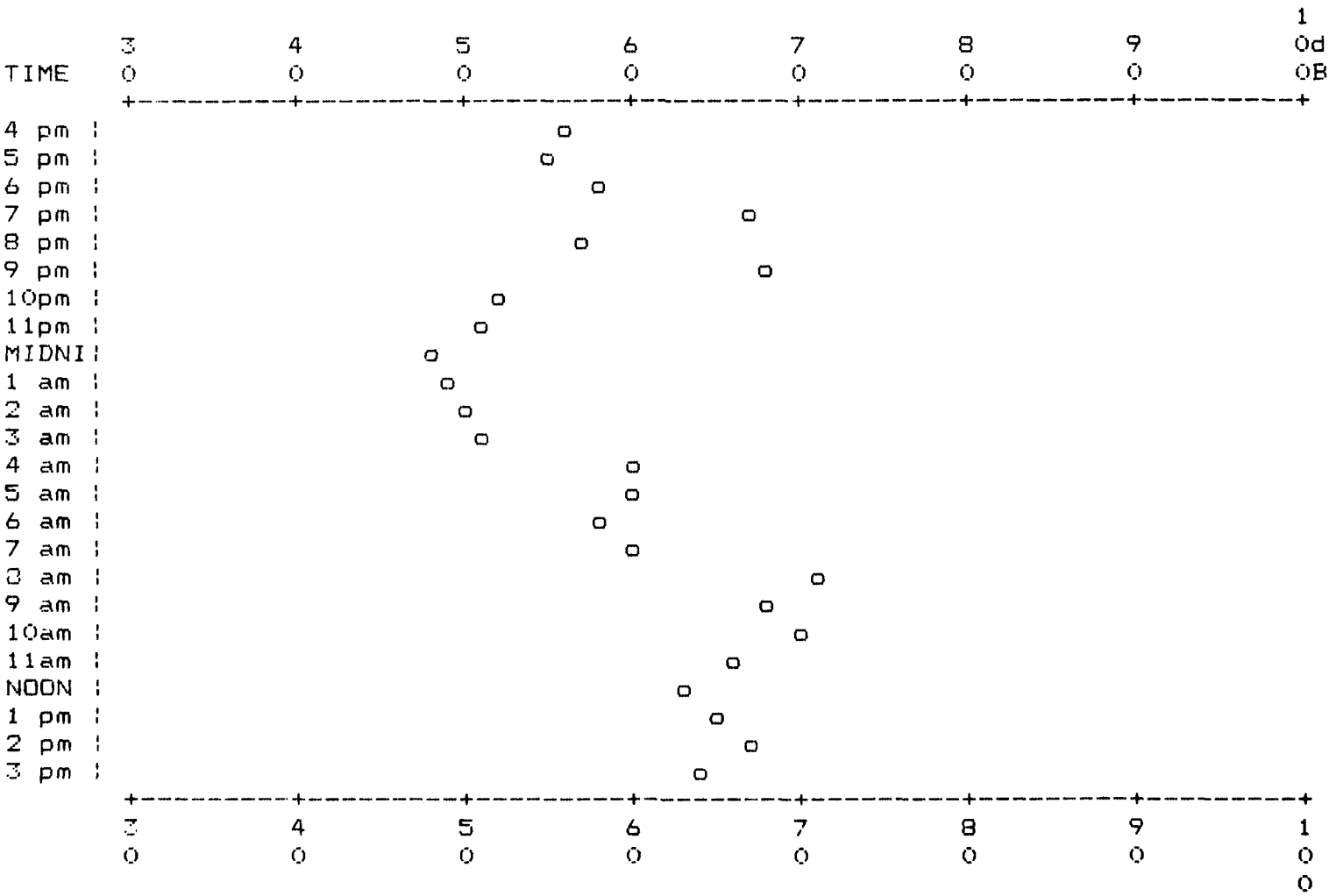
BY:
DATE:
LOCATION:

FROM FILE: P4_0628L

LEQ : o
LMAX : *

L E Q (24)= 63.9
L D N = 66.0
C N E L = 67.0

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0530
DATA FROM: P5_0627L
06/28/89 13:34:05

Time	0024:11:01
LVL	56.1
SEL	105.6
Lmin	35.5
Lmax	93
Lpk	128
Dose	11.9
Proj	3.9
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5198.0
L01	68
L10	53.5
L50	44.5
L90	39.5

Run date	06/27
Stop date	06/28
Run time 1	12:00
Stop time 1	12:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	28
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

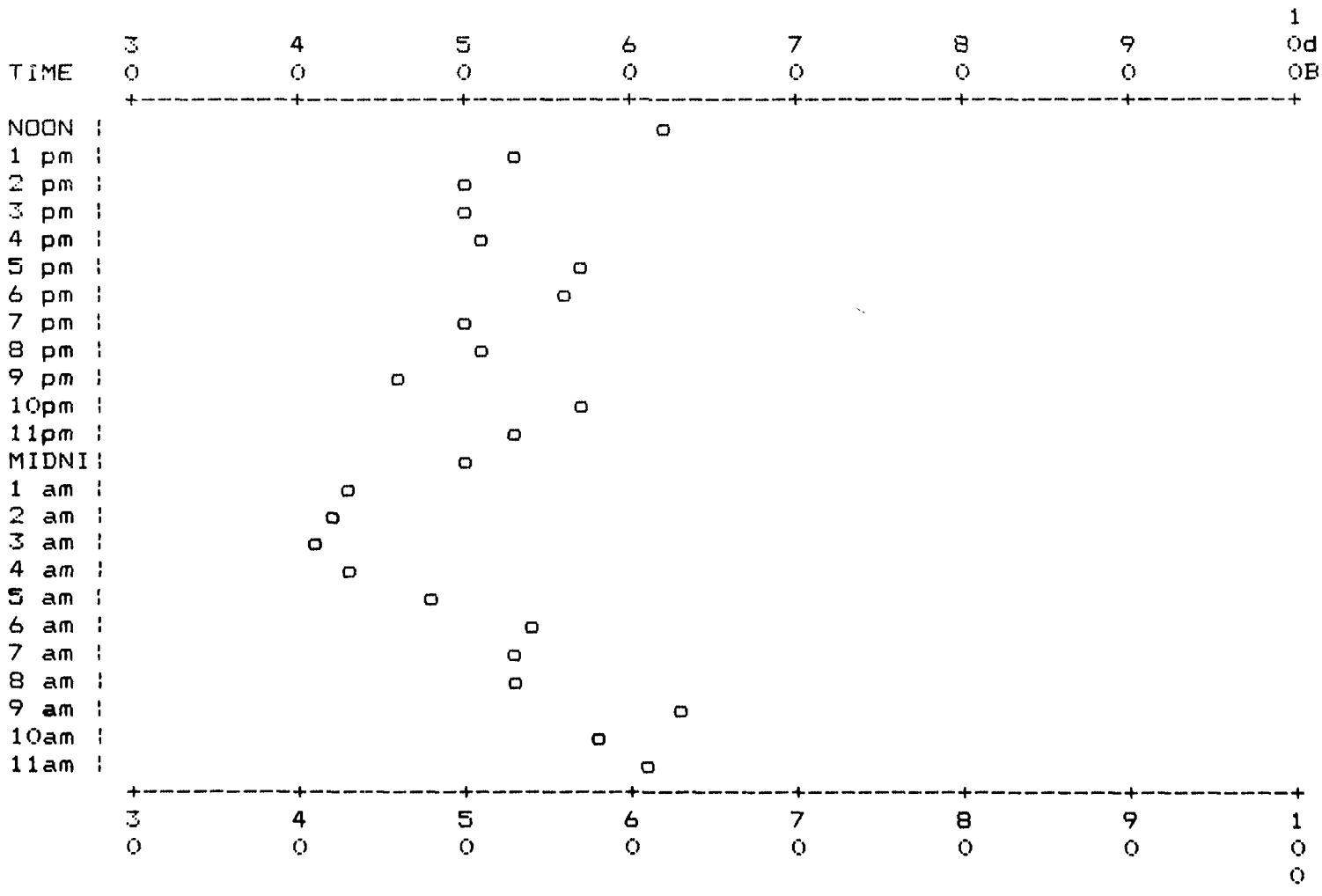
INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0530
DATA FROM: PS_0627L 06/28/89 13:34:05

Date 27 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
12:00:01	62.0	97.5	36.5	88.0	113.0	0	0	0	77.0	56.0	48.5	40.0
13:00:01	52.5	88.0	35.5	72.0	113.0	0	0	0	66.0	54.5	43.0	38.5
14:00:01	50.0	86.0	36.5	69.0	113.0	0	0	0	63.5	53.0	44.5	40.5
15:00:01	50.0	86.0	38.5	70.5	113.0	0	0	0	61.0	52.5	46.0	41.5
16:00:01	51.0	86.5	39.0	66.5	113.0	0	0	0	62.5	53.0	47.5	42.0
17:00:01	56.5	92.0	40.0	81.0	119.0	0	0	0	71.0	53.5	48.0	44.0
18:00:01	56.0	91.5	39.0	81.0	113.0	0	0	0	70.0	53.5	46.5	42.0
19:00:01	50.0	86.0	37.5	72.5	113.0	0	0	0	63.5	49.0	44.0	41.0
20:00:01	50.5	86.0	37.5	71.5	113.0	0	0	0	65.0	49.0	42.5	39.5
21:00:01	46.0	82.0	37.0	70.0	113.0	0	0	0	57.0	45.5	40.5	38.0
22:00:01	57.0	92.5	36.0	83.0	113.0	0	0	0	59.0	46.0	39.0	37.5
23:00:01	53.0	88.5	36.5	76.5	120.0	0	0	0	66.5	52.5	39.0	37.5
0:00:01	50.0	85.5	39.0	70.5	117.5	0	0	0	62.5	51.5	44.5	40.0
1:00:01	42.5	78.0	38.5	52.5	113.0	0	0	0	50.0	45.5	40.5	39.5
2:00:01	41.5	77.0	38.5	53.0	113.0	0	0	0	49.5	44.0	40.5	39.5
3:00:01	40.5	76.0	38.5	51.5	109.5	0	0	0	46.0	41.5	40.0	39.0
4:00:01	42.5	78.0	39.0	56.0	113.0	0	0	0	49.5	44.5	41.5	40.0
5:00:01	48.0	83.5	40.5	69.0	113.0	0	0	0	59.5	49.5	44.0	42.0
6:00:01	54.0	89.5	41.5	73.5	113.0	0	0	0	69.0	52.0	45.5	43.0
7:00:01	53.0	89.0	42.5	72.5	113.0	0	0	0	65.5	55.5	47.0	44.0
8:00:01	52.5	88.0	43.0	71.5	113.0	0	0	0	66.5	52.5	47.0	44.5
9:00:01	62.5	98.0	42.5	85.0	113.0	0	0	0	78.5	58.0	48.5	45.0
10:00:01	58.0	93.5	42.0	79.0	113.0	0	0	0	71.5	58.5	50.0	45.0
11:00:01	61.0	95.0	46.0	84.0	113.0	0	0	0	93.0	67.0	56.0	51.0
11:44:08	54.5	84.5	41.5	70.5	113.0	0	0	0	65.5	57.5	51.0	46.0
12:07:58	55.0	55.5	54.0	55.5	113.0	0	0	0	55.5	55.5	55.0	54.5
12:11:01	46.5	49.0	42.0	49.0	113.0	0	0	0	49.0	49.0	47.0	43.5
12:20:26	68.5	97.0	49.5	93.0	128.0	0	0	0	82.0	66.5	59.0	54.0

OVERALL LEQ: 57.6

```
        BY:                                                  LEQ    :  o
      DATE:                  FROM FILE: P5_0627L             LMAX   :  *
  LOCATION:
 L E Q (24)=  55.4
 L D N      =  59.4
 C N E L    =  59.5              24 HOURLY SAMPLES
```



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0531
DATA FROM: F5_0628B
07/01/89 12:53:28

Time	0023:59:58
LVL	58.3
SEL	107.6
Lmin	30
Lmax	94.5
Lpk	116
Dose	19.1
Proj	6.4
OVLD	00
RMS Ex	0000
Pk Ex	0000
Memory	5310.0
L01	69.5
L10	58.5
L50	48
L90	43.5

Run date	06/28
Stop date	06/29
Run time 1	18:00
Stop time 1	18:00
Run time 2	99:00
Stop time 2	99:00
Detector	SLOW
Weight	A
Unwgt Pk	ON
Criterion	70
Threshold	32
Exchange rate	3
RMS Threshold	115
Pk Threshold	140
Hysteresis	7
Exceedances	0
Intervals	24
Int time	01:00
Intv Ln's	ON
History	0
Save Peaks	OFF
Period	60.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0531
DATA FROM: P5_0628B 07/01/89 12:53:28

Date 28 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov	L01	L10	L50	L90
18:00:01	47.0	83.0	30.0	62.0	111.5	0	0	0	58.0	49.0	45.0	42.0
19:00:01	54.0	89.5	41.5	76.5	111.5	0	0	0	66.0	56.0	47.0	43.5
20:00:01	54.5	90.0	41.5	79.0	111.5	0	0	0	67.5	51.0	45.5	43.0
21:00:01	53.0	88.5	41.5	78.0	109.0	0	0	0	63.5	54.0	46.5	43.5
22:00:01	47.0	83.0	41.5	70.5	109.0	0	0	0	58.0	47.5	44.0	42.5
23:00:01	49.5	85.0	42.5	71.0	109.0	0	0	0	58.5	50.0	45.0	43.5
0:00:01	51.0	86.5	42.5	71.0	109.0	0	0	0	67.0	49.0	45.0	43.5
1:00:01	54.5	90.0	42.0	79.5	109.0	0	0	0	64.5	47.0	43.5	43.0
2:00:01	48.5	84.0	42.0	63.5	109.0	0	0	0	59.5	52.5	44.0	43.0
3:00:01	48.0	83.5	42.0	67.5	109.0	0	0	0	59.0	48.5	44.0	43.0
4:00:01	58.5	94.0	43.0	87.0	109.0	0	0	0	65.0	53.5	45.0	44.0
5:00:01	58.5	94.0	43.5	83.0	109.0	0	0	0	71.5	52.5	45.5	44.5
6:00:01	52.5	88.0	44.5	69.0	109.0	0	0	0	64.5	54.5	48.0	46.0
7:00:01	51.0	86.5	44.0	71.0	109.0	0	0	0	61.5	52.5	47.0	45.0
8:00:01	57.5	93.5	44.0	70.5	113.5	0	0	0	65.5	61.5	55.5	48.0
9:00:01	59.5	95.0	45.0	79.5	113.5	0	0	0	71.0	62.0	53.5	48.5
10:00:01	61.5	97.0	47.0	82.5	113.5	0	0	0	73.0	63.5	56.5	52.0
11:00:01	61.5	97.0	45.5	82.5	113.5	0	0	0	74.5	63.0	53.5	48.5
12:00:01	59.5	95.5	45.0	84.5	113.5	0	0	0	72.5	59.0	51.5	47.0
13:00:01	60.5	96.0	43.5	86.0	116.0	0	0	0	71.5	59.5	51.5	47.0
14:00:01	65.5	101.0	46.5	94.5	115.0	0	0	0	74.0	62.0	55.5	51.5
15:00:01	61.0	97.0	46.0	83.0	113.5	0	0	0	73.0	62.5	54.5	49.0
16:00:01	57.5	93.5	42.0	78.0	113.5	0	0	0	69.5	60.5	50.0	45.5
17:00:01	57.0	92.5	44.0	76.5	113.5	0	0	0	70.5	59.0	50.0	46.0

OVERALL LEQ: 58

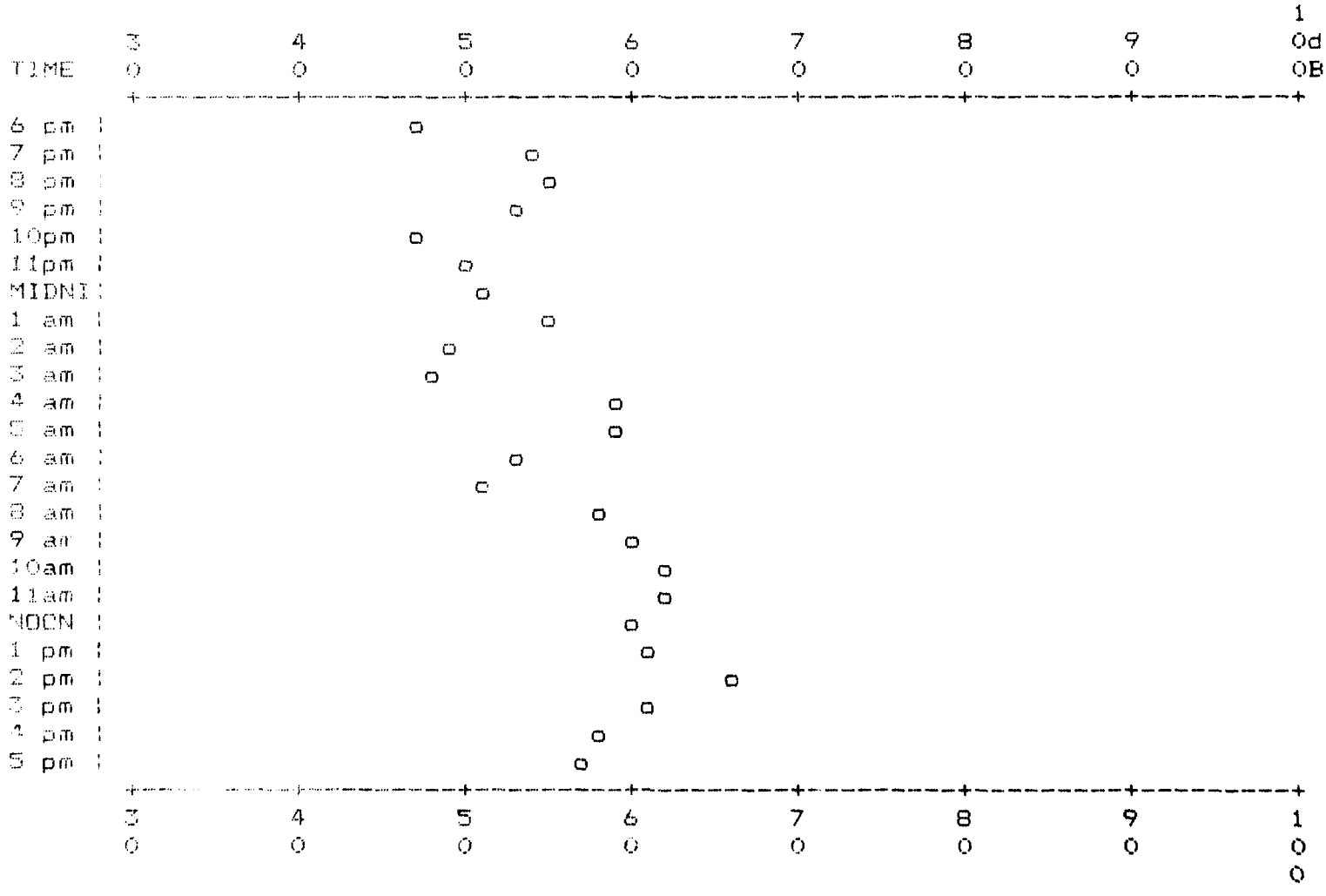
BY:
DATE:
LOCATION:

FROM FILE: P5_0628B

LEQ : o
LMAX : *

L E Q (24) = 58.1
L D N = 61.9
C N E L = 62.1

24 HOURLY SAMPLES



SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0531
DATA FROM: P5_627BS
06/28/89 13:30:23

Time	0023:01:05
LVL	204.3
SEL	253.6
Lmin	40.5
Lmax	147
Lpk	147
Dose	65535.0
Proj	65535.0
OVLD	81
RMS Ex	0000
Pk Ex	0084
Memory	6256.0
L01	68.5
L10	55
L50	46.5
L90	42.5

Run date	00/00
Stop date	00/00
Run time 1	99:00
Stop time 1	99:00
Run time 2	99:00
Stop time 2	99:00
Detector	IMPL
Weight	A
Unwgt Pk	OFF
Criterion	70
Threshold	140
Exchange rate	3
RMS Threshold	147.5
Pk Threshold	76
Hysteresis	#
Exceedances	1
Intervals	27
Int time	01:00
Intv Ln's	OFF
History	0
Save Peaks	OFF
Period	60.0

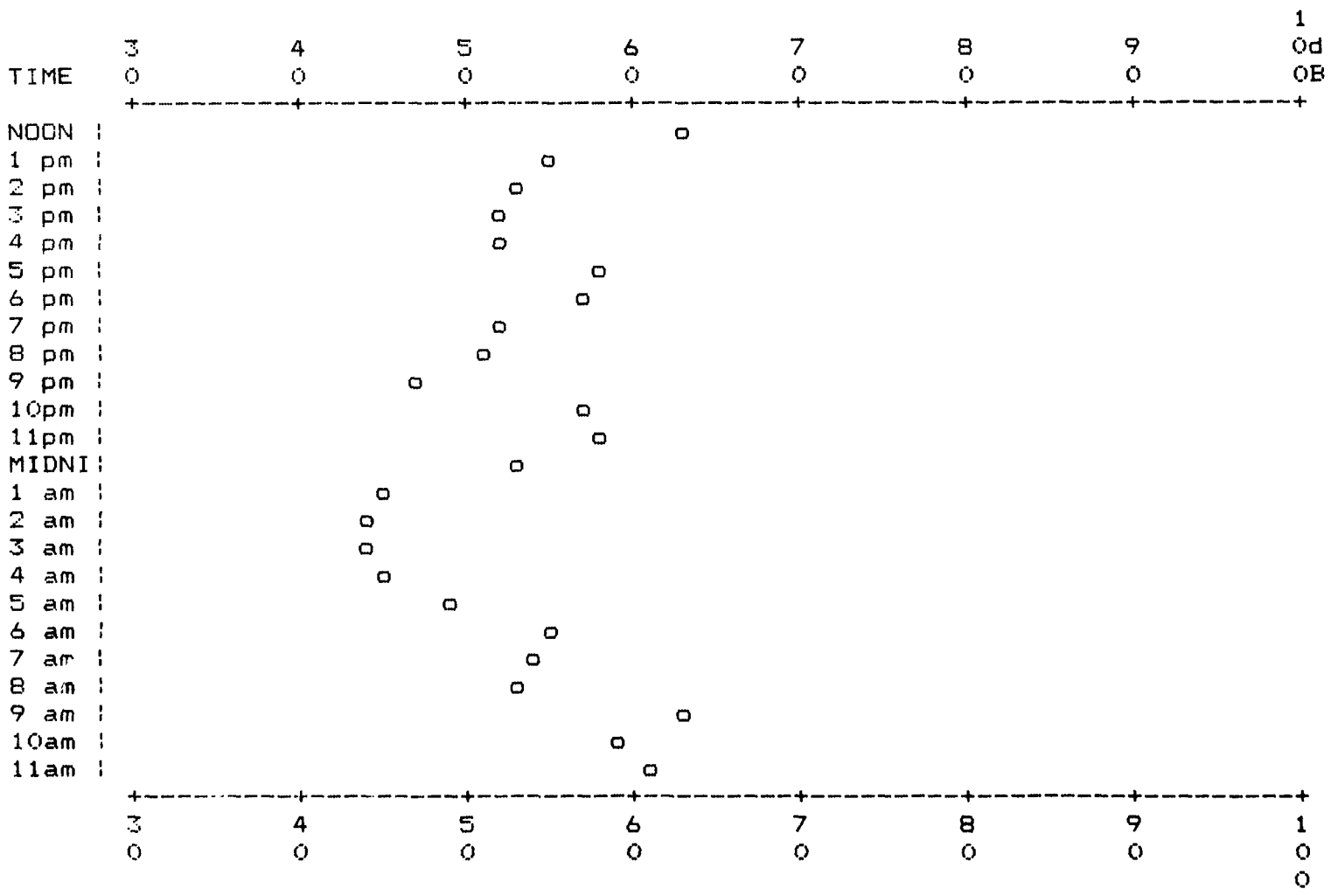
BY:
DATE:
LOCATION:

FROM FILE: P5_627BS

LEQ : o
LMAX : *

L E Q (24)= 56.1
L D N = 60.5
C N E L = 60.6

24 HOURLY SAMPLES



INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0531
DATA FROM: P5_627BS 06/28/89 13:30:23

Date 27 JUN Period 01:00 h:m

Time	LVL	SEL	Lmin	Lmax	Lpk	Ex	Pk	Ov
12:00:01	63.0	98.5	41.0	89.0	113.5	0	0	0
13:00:01	54.5	90.0	40.5	72.5	115.0	0	0	0
14:00:01	52.5	88.0	41.5	70.0	113.5	0	0	0
15:00:01	52.0	87.5	42.5	71.5	111.5	0	0	0
16:00:01	52.0	87.5	43.0	68.0	111.5	0	0	0
17:00:01	57.5	93.0	43.0	82.5	117.5	0	0	0
18:00:01	56.5	92.0	42.5	81.0	111.5	0	0	0
19:00:01	51.5	87.0	41.5	73.0	111.5	0	0	0
20:00:01	51.0	86.5	41.5	72.0	109.0	0	0	0
21:00:01	47.0	83.0	41.0	70.5	111.5	0	0	0
22:00:01	56.5	92.0	40.5	82.0	111.5	0	0	0
23:00:01	57.5	93.5	40.5	82.0	125.0	0	0	0
0:00:01	53.0	89.0	42.0	72.5	120.5	0	0	0
1:00:01	44.5	80.5	42.0	53.0	109.0	0	0	0
2:00:01	44.0	79.5	42.0	53.5	109.0	0	0	0
3:00:01	43.5	79.0	42.0	51.5	109.0	0	0	0
4:00:01	44.5	80.0	42.0	57.0	109.0	0	0	0
5:00:01	49.0	85.0	43.0	70.0	109.0	0	0	0
6:00:01	54.5	90.0	44.0	73.5	109.0	0	0	0
7:00:01	53.5	89.5	44.5	72.5	109.0	0	0	0
8:00:01	53.0	88.5	45.0	72.0	109.0	0	0	0
9:00:01	62.5	98.0	44.5	85.5	111.5	0	0	0
10:00:01	58.5	94.0	44.0	78.0	111.5	0	0	0
11:00:01	60.5	96.5	44.0	85.5	116.0	0	0	0
12:10:16	143.5	143.0	141.0	147.0	147.0	1	0	0
12:10:52	27.5	27.5	112.5	139.5	54.5	0	0	0
12:11:08	27.5	27.5	108.0	111.0	54.5	0	0	0

OVERALL LEQ: 129.1

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APPENDIX E

Site Data

SITE 1 ENGINE MAX THRUST

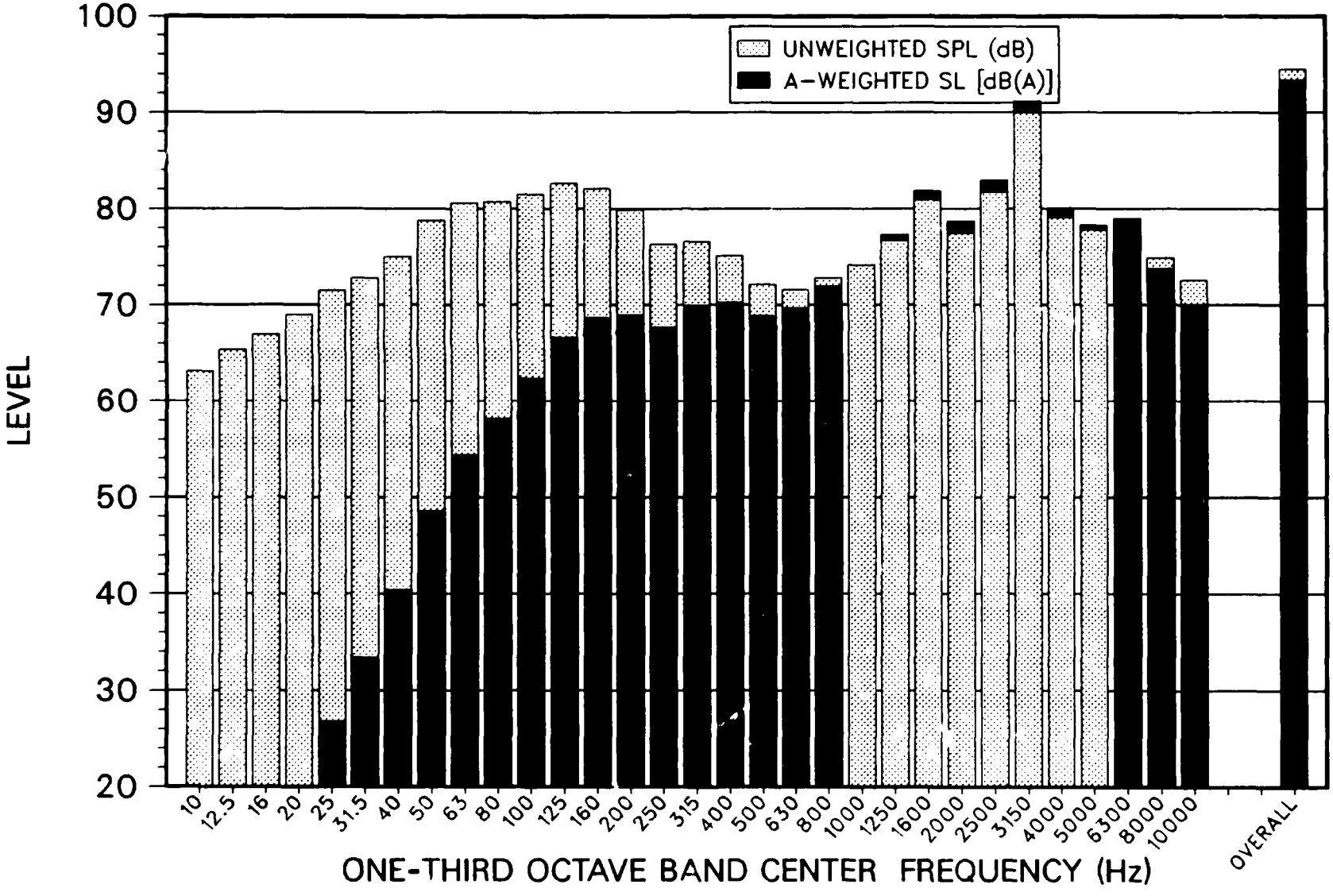
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	63.1		0		45.4	
12.5	65.4		2		51.1	
16	66.9	72.1	10.2	19.2	55.7	62.1
20	69		18.5		60.5	
25	71.5		26.8		65.3	
31.5	72.8	78.1	33.4	41.3	68.4	74.2
40	75		40.4		72	
50	78.8		48.6		76.8	
63	80.6	84.9	54.4	60	79.3	83.6
80	80.7		58.2		79.9	
100	81.5		62.4		81	
125	82.7	86.9	66.6	71.4	82.4	86.6
160	82.1		68.7		81.9	
200	79.9		69		79.8	
250	76.3	82.7	67.7	73.8	76.3	82.6
315	76.6		70		76.6	
400	75.1		70.3		75.1	
500	72.1	78	68.9	74.4	72.1	78
630	71.6		69.7		71.6	
800	72.8		72		72.8	
1,000	74.2	79.6	74.2	79.8	74.2	79.6
1,250	76.7		77.3		76.7	
1,600	80.9		81.9		80.9	
2,000	77.5	85.1	78.7	86.3	77.4	85
2,500	81.7		83		81.5	
3,150	90		91.2		89.7	
4,000	79.1	90.6	80.1	91.7	78.6	90.2
5,000	77.8		78.3		77	
6,300	79		78.9		77.7	
8,000	74.9	81.1	73.8	80.5	72.9	79.5
10,000	72.6		70.1		70.6	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 94.5 dB OASLA = 93.4 dB(A)

OASLC = 94 dB C-A = .6 dB

SITE 1 ENGINE MAX THRUST



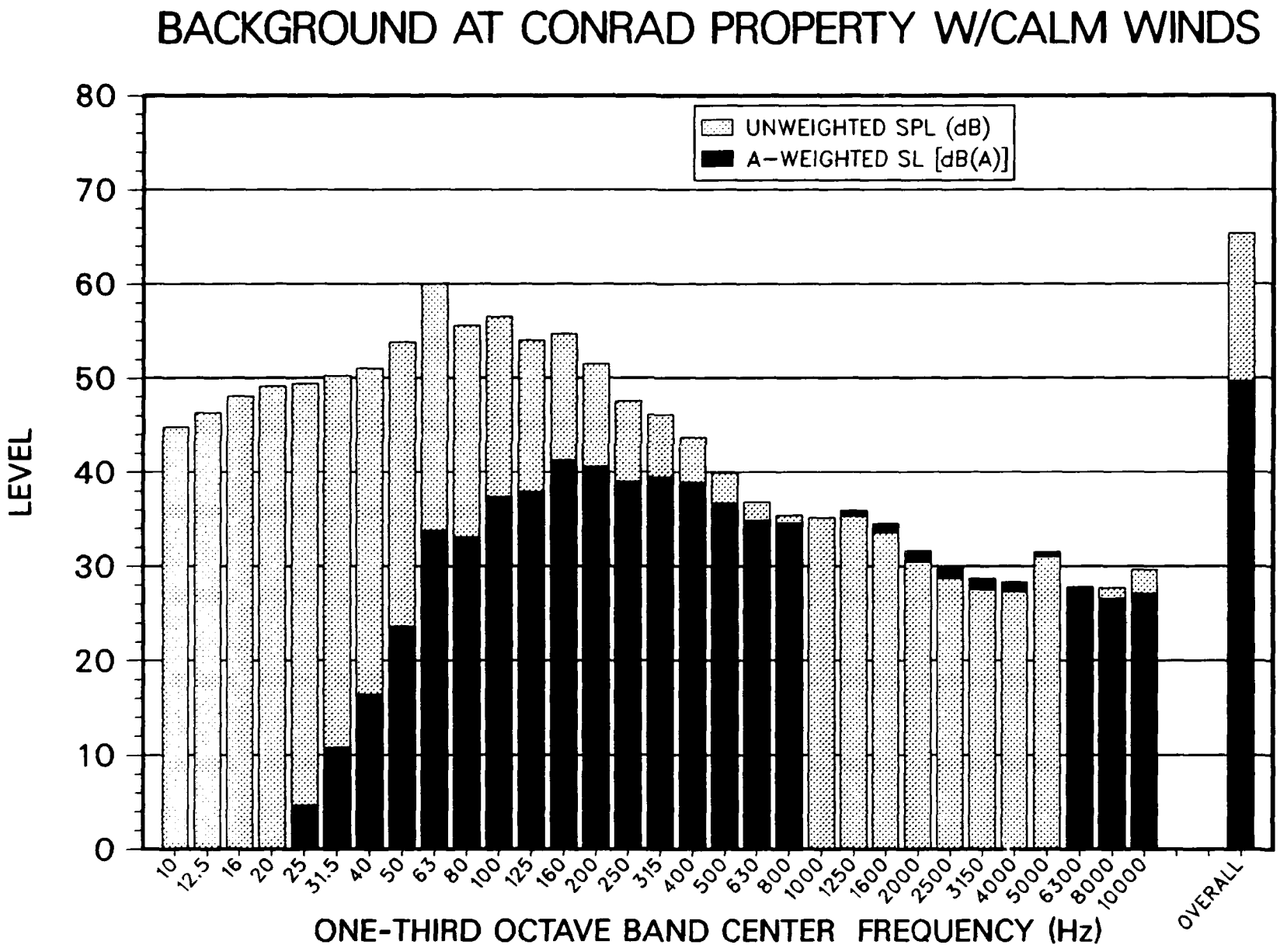
BACKGROUND AT CONRAD PROPERTY W/CALM WINDS

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	44.8		0		27.1	
12.5	46.3		0		32	
16	48.1	52.8	0	4.8	36.9	42.5
20	49.1		0		40.6	
25	49.4		4.7		43.2	
31.5	50.2	55	10.8	17.7	45.8	50.9
40	51		16.4		48	
50	53.8		23.6		51.8	
63	60	62	33.8	36.7	58.7	60.8
80	55.6		33.1		54.8	
100	56.5		37.4		56	
125	54	60	37.9	44	53.7	59.6
160	54.7		41.3		54.5	
200	51.5		40.6		51.4	
250	47.6	53.8	39	44.5	47.6	53.7
315	46.1		39.5		46.1	
400	43.7		38.9		43.7	
500	39.9	45.8	36.7	41.9	39.9	45.8
630	36.8		34.9		36.8	
800	35.4		34.6		35.4	
1,000	35.1	40	35.1	40	35.1	40
1,250	35.3		35.9		35.3	
1,600	33.5		34.5		33.5	
2,000	30.4	36.1	31.6	37.2	30.3	36
2,500	28.7		30		28.5	
3,150	27.5		28.7		27.2	
4,000	27.3	33.7	28.3	34.5	26.8	33.1
5,000	31		31.5		30.2	
6,300	27.8		27.7		26.5	
8,000	27.7	33.2	26.6	31.9	25.7	31.4
10,000	29.6		27.1		27.6	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 65.4 dB OASLA = 49.7 dB(A)

OASLC = 64.1 dB C-A = 14.4 dB


BACKGROUND AT CONRAD PROPERTY W/CALM WINDS
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
80
70
60
50
40
30
20
10
0
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

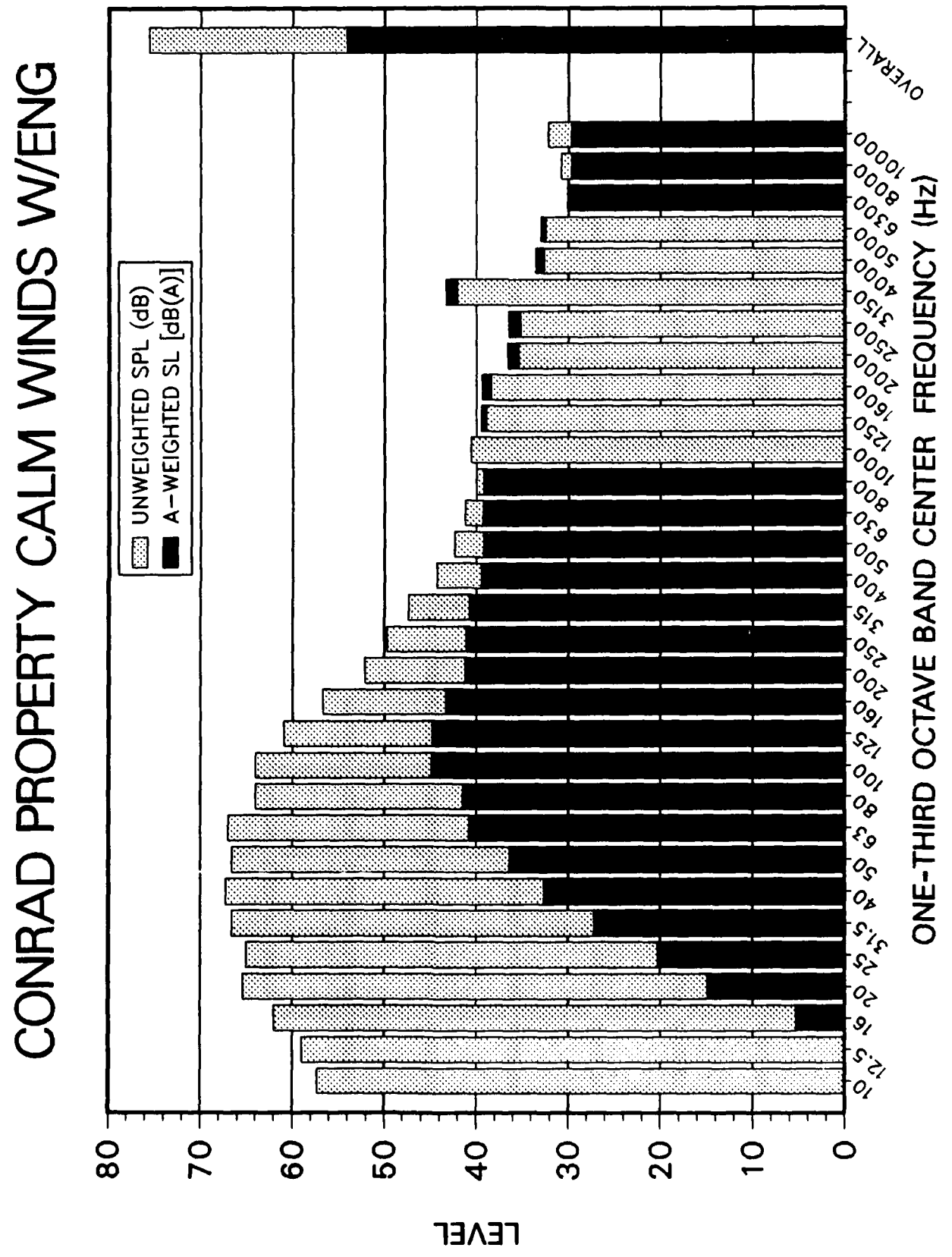
CONRAD PROPERTY CALM WINDS W/ENG

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	57.3		0		39.6	
12.5	59		0		44.7	
16	62	67.7	5.3	15.5	50.8	58.1
20	65.4		14.9		56.9	
25	65		20.3		58.8	
31.5	66.6	71.2	27.2	34	62.2	67.1
40	67.3		32.7		64.3	
50	66.6		36.4		64.6	
63	67	70.8	40.8	44.8	65.7	69.4
80	64		41.5		63.2	
100	64		44.9		63.5	
125	60.9	66.2	44.8	49.2	60.6	65.8
160	56.7		43.3		56.5	
200	52.1		41.2		52	
250	49.7	54.9	41.1	45.8	49.7	54.9
315	47.4		40.8		47.4	
400	44.3		39.5		44.3	
500	42.4	47.6	39.2	44.1	42.4	47.6
630	41.2		39.3		41.2	
800	40		39.2		40	
1,000	40.6	44.7	40.6	44.6	40.6	44.7
1,250	38.9		39.5		38.9	
1,600	38.4		39.4		38.4	
2,000	35.4	41.4	36.6	42.5	35.3	41.3
2,500	35.2		36.5		35	
3,150	42.1		43.3		41.8	
4,000	32.6	43	33.6	44.1	32.1	42.6
5,000	32.5		33		31.7	
6,300	30.1		30		28.8	
8,000	30.8	35.9	29.7	34.6	28.8	34.1
10,000	32.2		29.7		30.2	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 75.6 dB OASLA = 54.1 dB(A)

OASLC = 72.7 dB C-A = 18.6 dB


CONRAD PROPERTY CALM WINDS W/ENG
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
OVERALL
10000
8000
6300
5000
4000
3150
2500
2000
1600
1250
1000
800
630
500
400
315
250
200
160
125
100
80
63
50
40
31.5
25
20
16
12.5
10

SITE 2 ENG MAX THRUST W/WIND

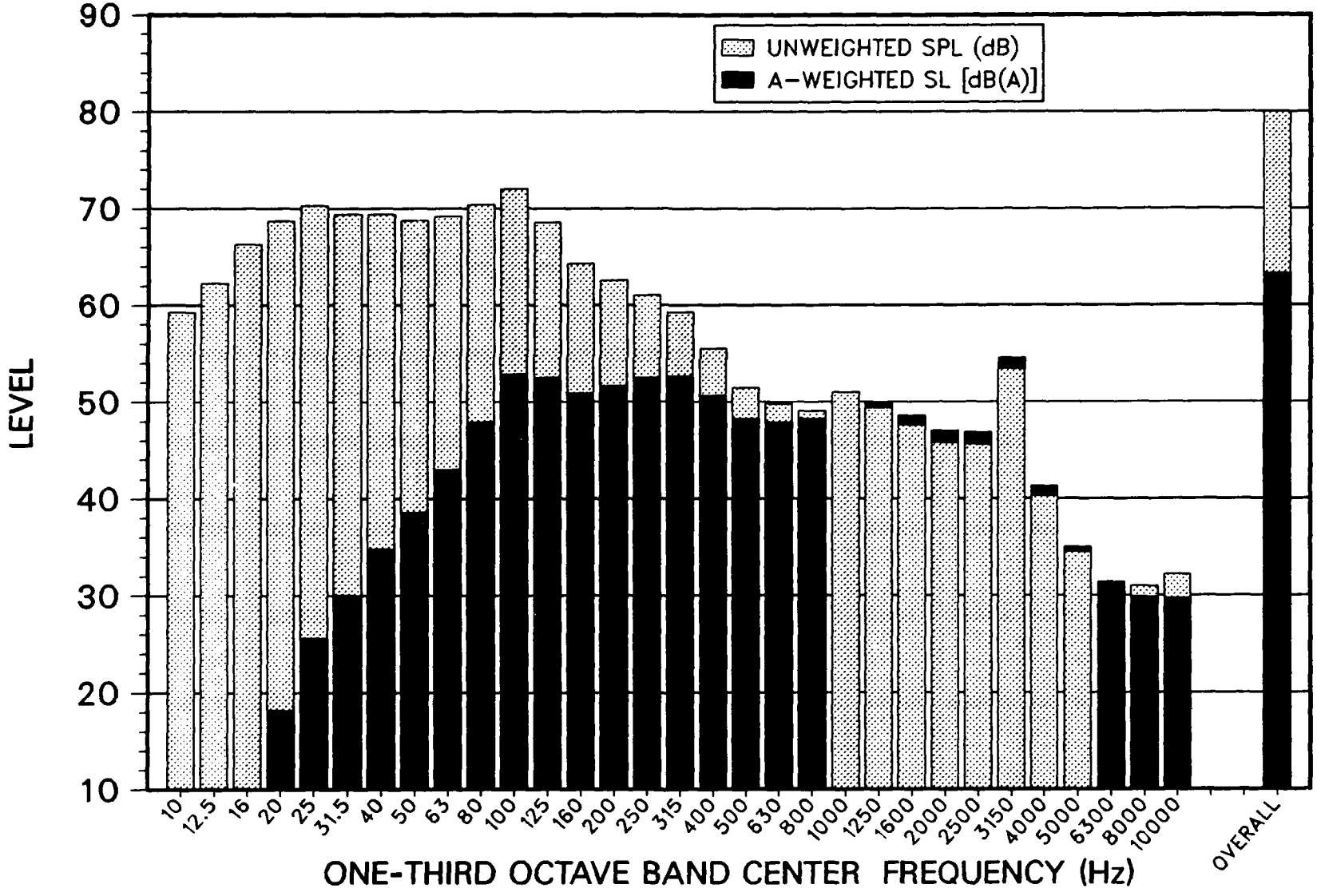
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	59.3		0		41.6	
12.5	62.3		0		48	
16	66.3	71.3	9.6	18.8	55.1	61.6
20	68.7		18.2		60.2	
25	70.3		25.6		64.1	
31.5	69.4	74.5	30	36.4	65	70
40	69.4		34.8		66.4	
50	68.8		38.6		66.8	
63	69.2	74.3	43	49.5	67.9	73
80	70.4		47.9		69.6	
100	72		52.9		71.5	
125	68.6	74.1	52.5	57	68.3	73.7
160	64.3		50.9		64.1	
200	62.6		51.7		62.5	
250	61.1	66	52.5	57.1	61.1	65.9
315	59.3		52.7		59.3	
400	55.5		50.7		55.5	
500	51.5	57.7	48.3	53.9	51.5	57.7
630	49.8		47.9		49.8	
800	49.1		48.3		49.1	
1,000	51	54.7	51	54.7	51	54.7
1,250	49.4		50		49.4	
1,600	47.6		48.6		47.6	
2,000	45.8	51.2	47	52.3	45.7	51.1
2,500	45.6		46.9		45.4	
3,150	53.4		54.6		53.1	
4,000	40.3	53.7	41.3	54.8	39.8	53.3
5,000	34.5		35		33.7	
6,300	31.4		31.3		30.1	
8,000	31	36.3	29.9	35.1	29	34.6
10,000	32.2		29.7		30.2	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 80 dB OASLA = 63.3 dB(A)

OASLC = 77.8 dB C-A = 14.5 dB

SITE 2 ENG MAX THRUST W/WIND



LYNBROOK RD ENGINE MAX THRUST

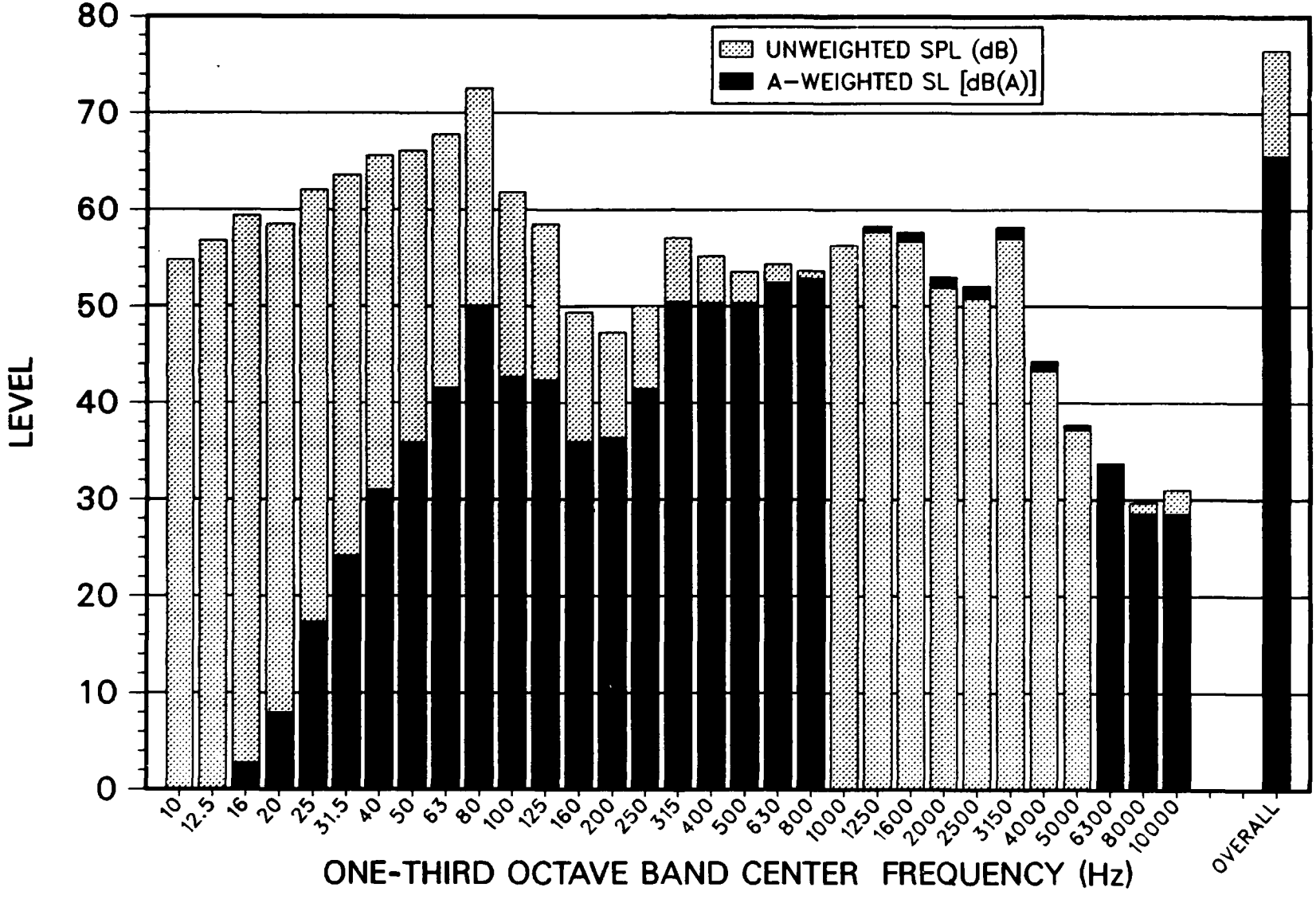
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	54.8		0		37.1	
12.5	56.8		0		42.5	
16	59.4	63.1	2.7	9.6	48.2	52.6
20	58.5		8		50	
25	62.1		17.4		55.9	
31.5	63.6	68.8	24.2	32	59.2	64.8
40	65.6		31		62.6	
50	66.1		35.9		64.1	
63	67.8	74.5	41.6	50.8	66.5	73.5
80	72.6		50.1		71.8	
100	61.8		42.7		61.3	
125	58.5	63.6	42.4	46	58.2	63.2
160	49.4		36		49.2	
200	47.3		36.4		47.2	
250	50.1	58.3	41.5	51.2	50.1	58.2
315	57.1		50.5		57.1	
400	55.2		50.4		55.2	
500	53.6	59.2	50.4	56	53.6	59.2
630	54.4		52.5		54.4	
800	53.7		52.9		53.7	
1,000	56.3	61	56.3	61.1	56.3	61
1,250	57.7		58.3		57.7	
1,600	56.7		57.7		56.7	
2,000	51.9	58.7	53.1	59.8	51.8	58.7
2,500	50.8		52.1		50.6	
3,150	57		58.2		56.7	
4,000	43.3	57.2	44.3	58.4	42.8	56.9
5,000	37.2		37.7		36.4	
6,300	33.8		33.7		32.5	
8,000	29.7	36.6	28.6	35.8	27.7	35
10,000	31		28.5		29	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 76.5 dB OASLA = 65.6 dB(A)

OASLC = 75 dB C-A = 9.4 dB

LYNBROOK RD ENGINE MAX THRUST



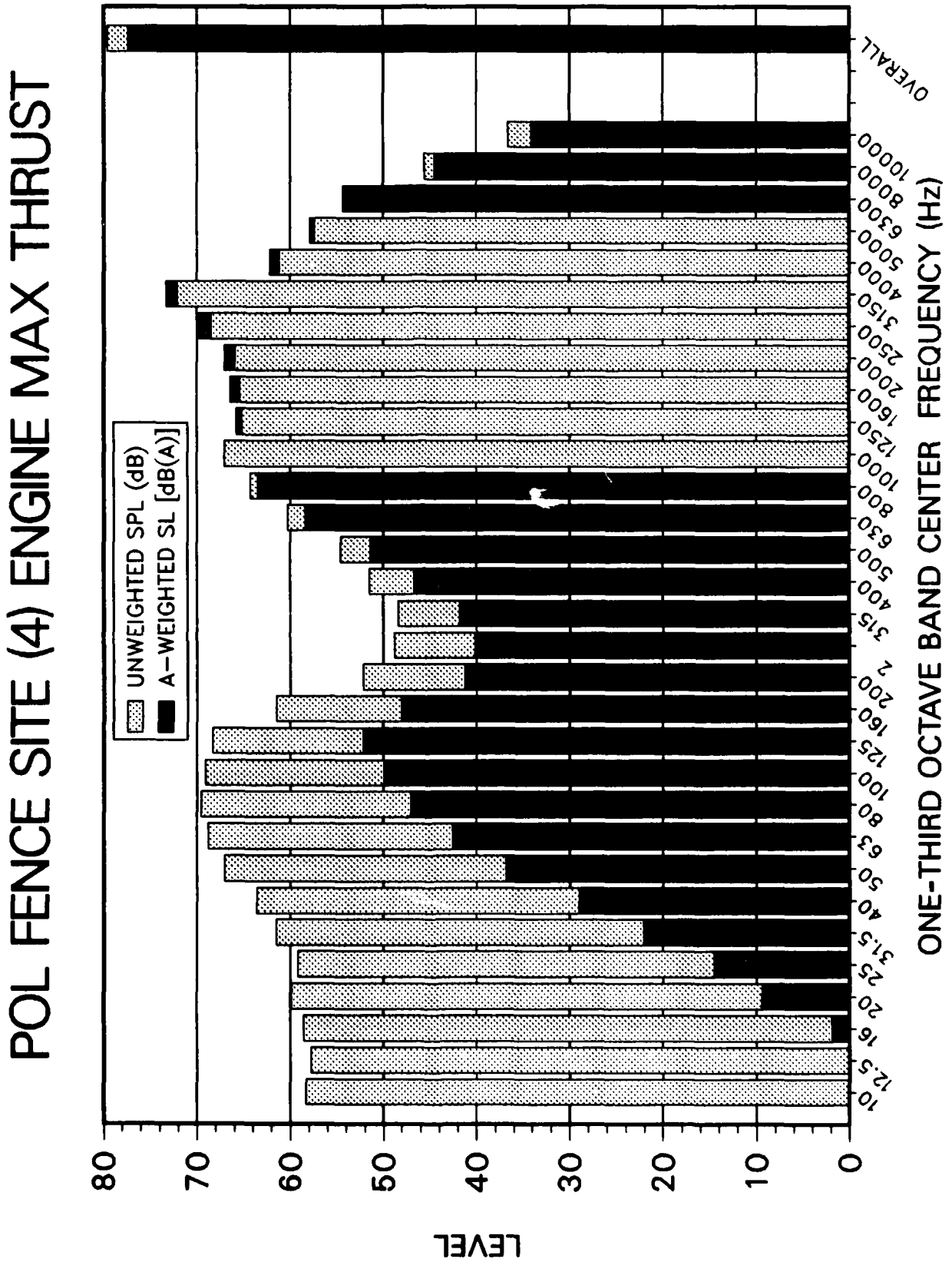
POL FENCE (4) SITE ENGINE MAX THRUST

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	58.3		0		40.6	
12.5	57.8		0		43.5	
16	58.6	63.6	1.9	10.5	47.4	53.3
20	59.9		9.4		51.4	
25	59.2		14.5		53	
31.5	61.5	66.6	22.1	29.9	57.1	62.7
40	63.6		29		60.6	
50	67.1		36.9		65.1	
63	68.8	73.4	42.6	48.7	67.5	72.2
80	69.6		47.1		68.8	
100	69.1		50		68.6	
125	68.3	72.1	52.2	55.2	68	71.7
160	61.5		48.1		61.3	
200	52.2		41.3		52.1	
250	48.8	54.9	40.2	45.9	48.8	54.9
315	48.4		41.8		48.4	
400	51.5		46.7		51.5	
500	54.6	61.8	51.4	59.4	54.6	61.8
630	60.3		58.4		60.3	
800	64.3		63.5		64.3	
1,000	67.1	70.5	67.1	70.5	67.1	70.5
1,250	65.2		65.8		65.2	
1,600	65.4		66.4		65.4	
2,000	65.9	71.6	67.1	72.8	65.8	71.5
2,500	68.5		69.8		68.3	
3,150	72.1		73.3		71.8	
4,000	61.2	72.6	62.2	73.7	60.7	72.2
5,000	57.4		57.9		56.6	
6,300	54.3		54.2		53	
8,000	45.6	54.9	44.5	54.7	43.6	53.5
10,000	36.6		34.1		34.6	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 79.6 dB OASLA = 77.4 dB(A)

OASLC = 78.9 dB C-A = 1.5 dB


POL FENCE SITE (4) ENGINE MAX THRUST
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

SITE 5 BACKGROUND

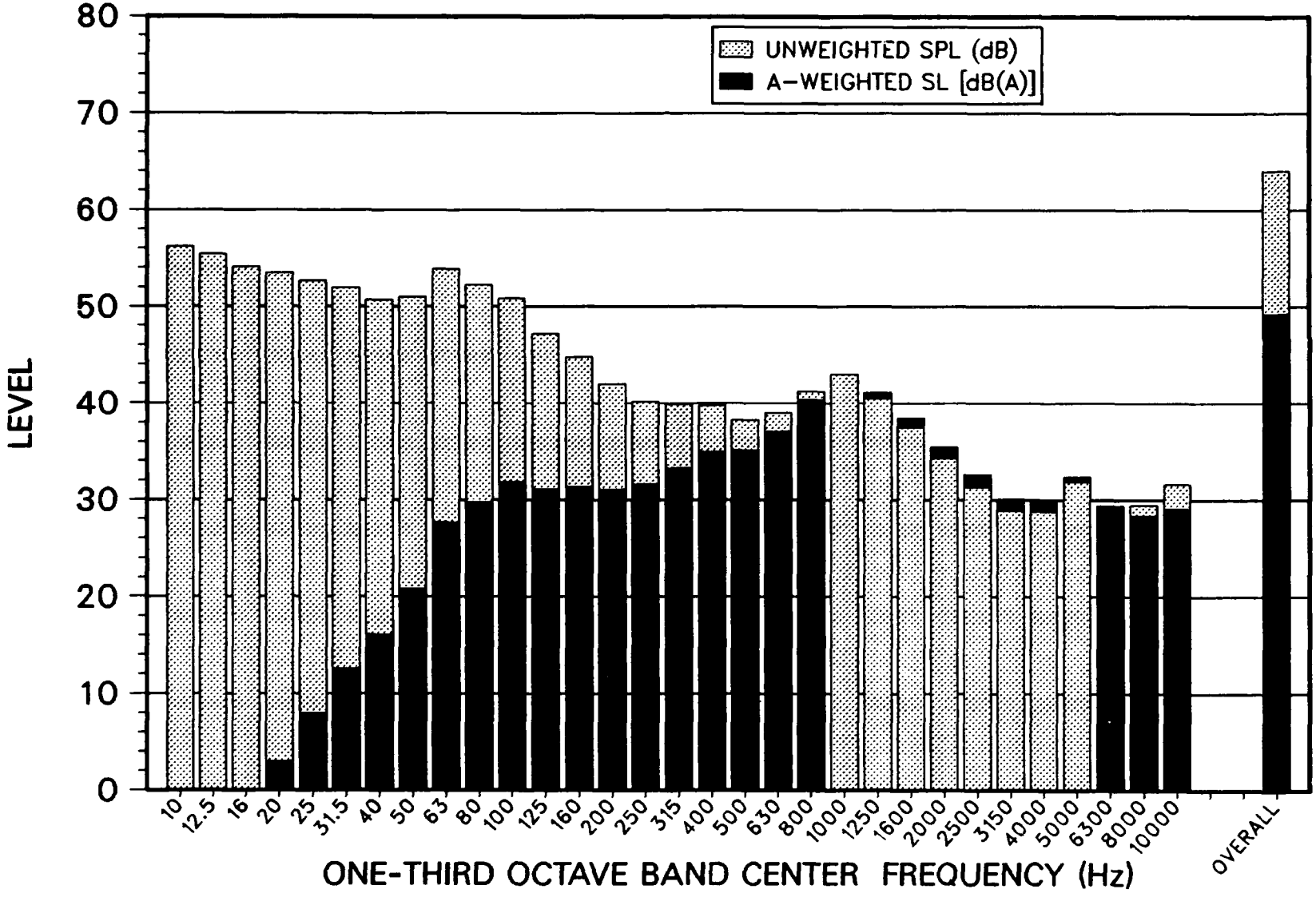
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	56.2		0		38.5	
12.5	55.4		0		41.1	
16	54.1	59.2	0	6	42.9	48.1
20	53.5		3		45	
25	52.7		8		46.5	
31.5	52	56.6	12.6	18.1	47.6	52.1
40	50.7		16.1		47.7	
50	51		20.8		49	
63	53.9	57.3	27.7	32.2	52.6	56
80	52.3		29.8		51.5	
100	50.9		31.8		50.4	
125	47.2	53.1	31.1	36.2	46.9	52.7
160	44.8		31.4		44.6	
200	42		31.1		41.9	
250	40.2	45.6	31.6	36.9	40.2	45.5
315	39.9		33.3		39.9	
400	39.8		35		39.8	
500	38.3	43.8	35.1	40.6	38.3	43.8
630	39		37.1		39	
800	41.2		40.4		41.2	
1,000	43	46.5	43	46.4	43	46.5
1,250	40.5		41.1		40.5	
1,600	37.5		38.5		37.5	
2,000	34.3	39.9	35.5	41	34.2	39.8
2,500	31.3		32.6		31.1	
3,150	28.9		30.1		28.6	
4,000	28.8	34.9	29.8	35.7	28.3	34.3
5,000	31.9		32.4		31.1	
6,300	29.4		29.3		28.1	
8,000	29.5	35.1	28.4	33.7	27.5	33.3
10,000	31.6		29.1		29.6	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 64.1 dB OASLA = 49.3 dB(A)

OASLC = 59.7 dB C-A = 10.4 dB

SITE 5 BACKGROUND



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APPENDIX F

Other Noise Sources

SITE 2 W/BOAT PASSING NEAR SHORE

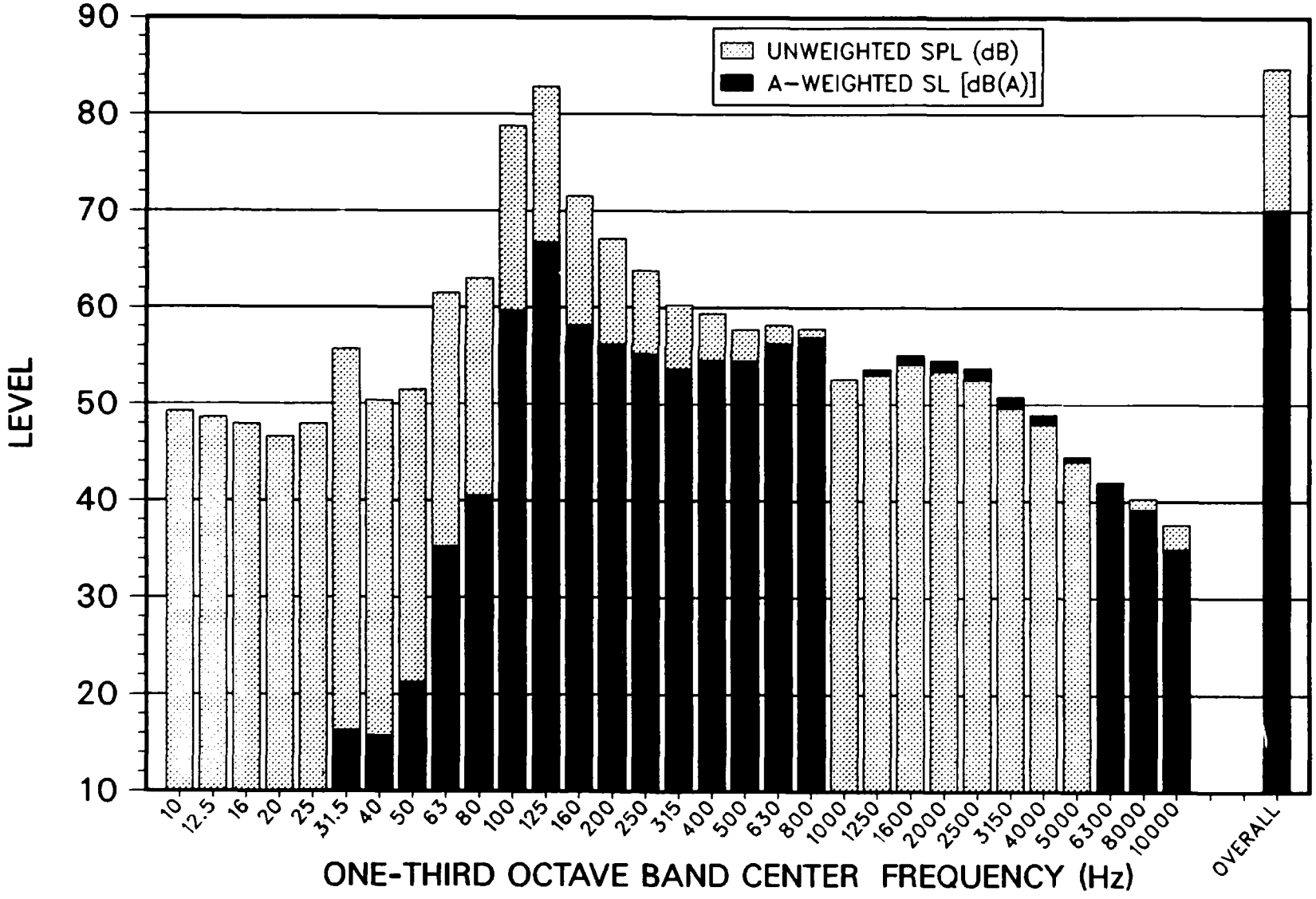
FREQ (Hz)	SOUNL PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	49.2		0		31.5	
12.5	48.6		0		34.3	
16	47.9	52.5	0	4.8	36.7	41.4
20	46.6		0		38.1	
25	47.9		3.2		41.7	
31.5	55.7	57.3	16.3	19.2	51.3	53.1
40	50.4		15.8		47.4	
50	51.5		21.3		49.5	
63	61.5	65.5	35.3	41.7	60.2	64.5
80	63		40.5		62.2	
100	78.8		59.7		78.3	
125	82.9	84.6	66.8	68	82.6	84.2
160	71.6		58.2		71.4	
200	67.1		56.2		67	
250	63.8	69.3	55.2	59.9	63.8	69.3
315	60.3		53.7		60.3	
400	59.4		54.6		59.4	
500	57.7	63.3	54.5	60	57.7	63.3
630	58.2		56.3		58.2	
800	57.8		57		57.8	
1,000	52.6	59.9	52.6	59.6	52.6	59.9
1,250	53		53.6		53	
1,600	54.1		55.1		54.1	
2,000	53.4	58.2	54.6	59.3	53.3	58.1
2,500	52.5		53.8		52.3	
3,150	49.6		50.8		49.3	
4,000	47.9	52.5	48.9	53.6	47.4	52.1
5,000	44.1		44.6		43.3	
6,300	42		41.9		40.7	
8,000	40.3	45.1	39.2	44.3	38.3	43.5
10,000	37.6		35.1		35.6	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 84.8 dB OASLA = 70.2 dB(A)

OASLC = 84.5 dB C-A = 14.3 dB

SITE 2 W/ BOAT PASSING NEAR SHORE



SITE 2 BACKGROUND WITH SPEED BOAT

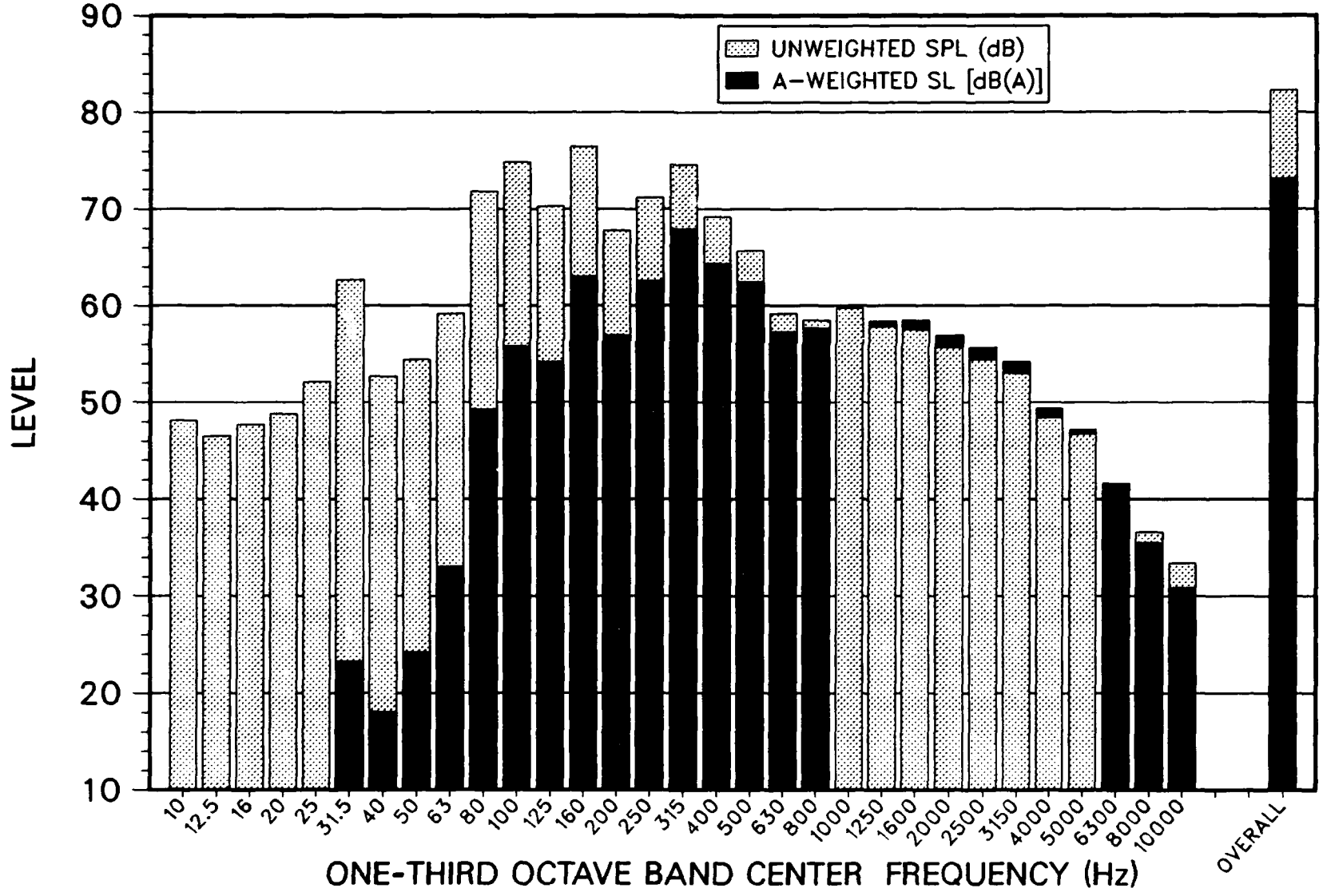
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	48.1		0		30.4	
12.5	46.5		0		32.2	
16	47.7	52.5	0	4.8	36.5	42.3
20	48.8		0		40.3	
25	52.1		7.4		45.9	
31.5	62.7	63.4	23.3	24.5	58.3	59.1
40	52.7		18.1		49.7	
50	54.4		24.2		52.4	
63	59.2	72.1	33	49.4	57.9	71.3
80	71.8		49.3		71	
100	74.9		55.8		74.4	
125	70.3	79.4	54.2	64.3	70	79
160	76.5		63.1		76.3	
200	67.8		56.9		67.7	
250	71.2	76.8	62.6	69.4	71.2	76.8
315	74.6		68		74.6	
400	69.2		64.4		69.2	
500	65.7	71.1	62.5	67	65.7	71.1
630	59.2		57.3		59.2	
800	58.5		57.7		58.5	
1,000	59.8	63.6	59.8	63.5	59.8	63.6
1,250	57.8		58.4		57.8	
1,600	57.5		58.5		57.5	
2,000	55.7	60.8	56.9	62	55.6	60.7
2,500	54.4		55.7		54.2	
3,150	53		54.2		52.7	
4,000	48.4	55	49.4	56	47.9	54.6
5,000	46.7		47.2		45.9	
6,300	41.6		41.5		40.3	
8,000	36.6	43.3	35.5	42.8	34.6	41.8
10,000	33.4		30.9		31.4	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 82.3 dB OASLA = 73.2 dB(A)

OASLC = 82 dB C-A = 8.8 dB

SITE 2 BACKGROUND WITH SPEED BOAT



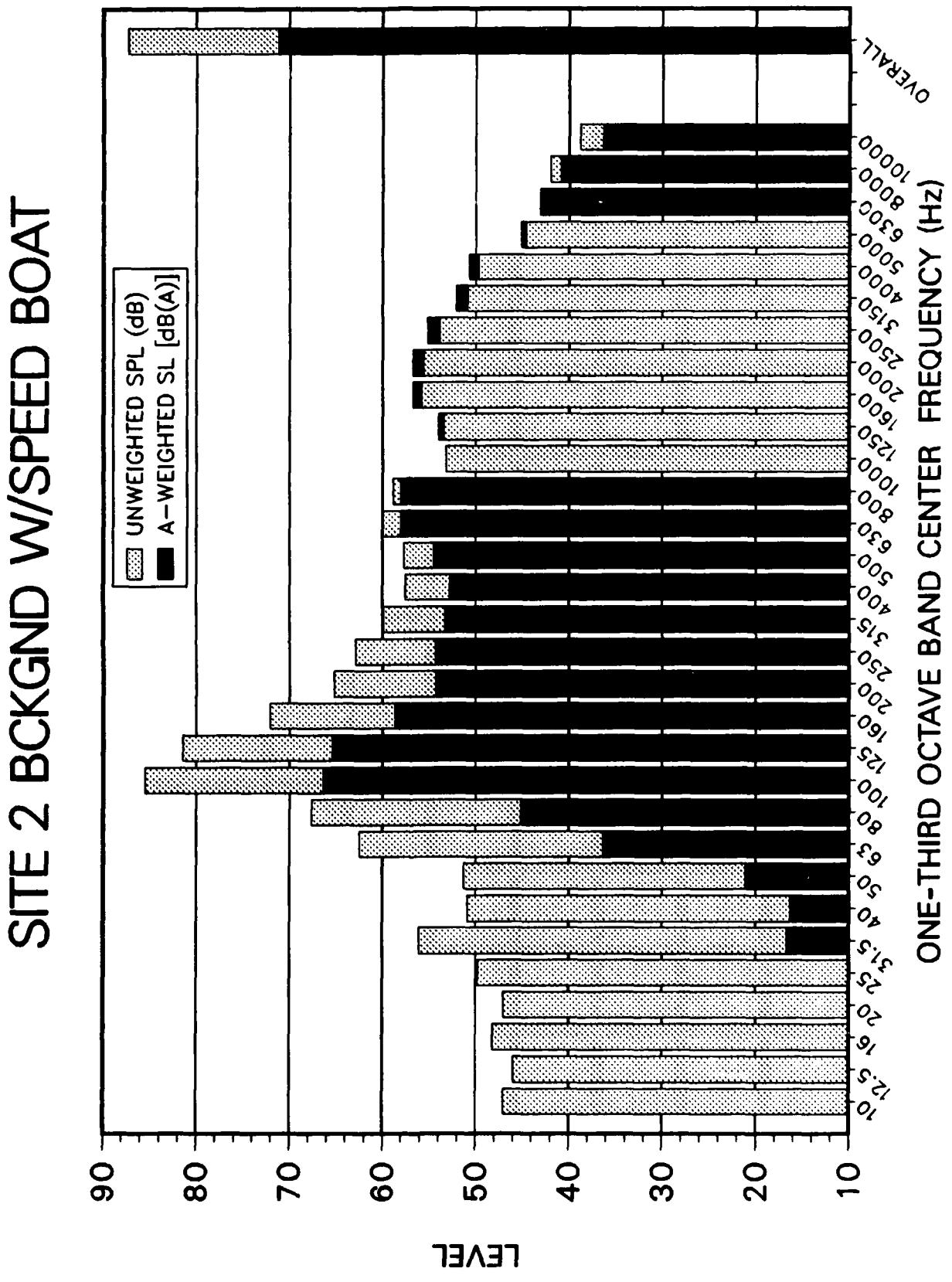
SITE 2 BCKGND W/SPEED BOAT

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	47		0		29.3	
12.5	46		0		31.7	
16	48.2	51.9	0	4.8	37	41.3
20	47		0		38.5	
25	49.8		5.1		43.6	
31.5	56.1	58	16.7	19.7	51.7	53.7
40	50.9		16.3		47.9	
50	51.3		21.1		49.3	
63	62.5	68.8	36.3	45.7	61.2	67.9
80	67.6		45.1		66.8	
100	85.5		66.4		85	
125	81.5	87.1	65.4	69.3	81.2	86.7
160	72.1		58.7		71.9	
200	65.2		54.3		65.1	
250	62.9	68	54.3	58.8	62.9	67.9
315	59.9		53.3		59.9	
400	57.6		52.8		57.6	
500	57.7	63.4	54.5	60.5	57.7	63.4
630	60		58.1		60	
800	58.9		58.1		58.9	
1,000	53.2	60.8	53.2	60.4	53.2	60.8
1,250	53.4		54		53.4	
1,600	55.8		56.8		55.8	
2,000	55.6	60	56.8	61.1	55.5	59.9
2,500	53.9		55.2		53.7	
3,150	50.9		52.1		50.6	
4,000	49.7	53.9	50.7	54.9	49.2	53.5
5,000	44.6		45.1		43.8	
6,300	43.1		43		41.8	
8,000	42	46.4	40.9	45.6	40	44.8
10,000	38.8		36.3		36.8	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 87.3 dB OASLA = 71.2 dB(A)

OASLC = 86.8 dB C-A = 15.6 dB


SITE 2 BCKGND W/SPEED BOAT
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
90
80
70
60
50
40
30
20
10
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
OVERALL
10000
8000
6300
5000
4000
3150
2500
2000
1600
1250
1000
800
630
500
400
315
250
200
160
125
100
80
63
50
40
31.5
25
20
16
12.5
10

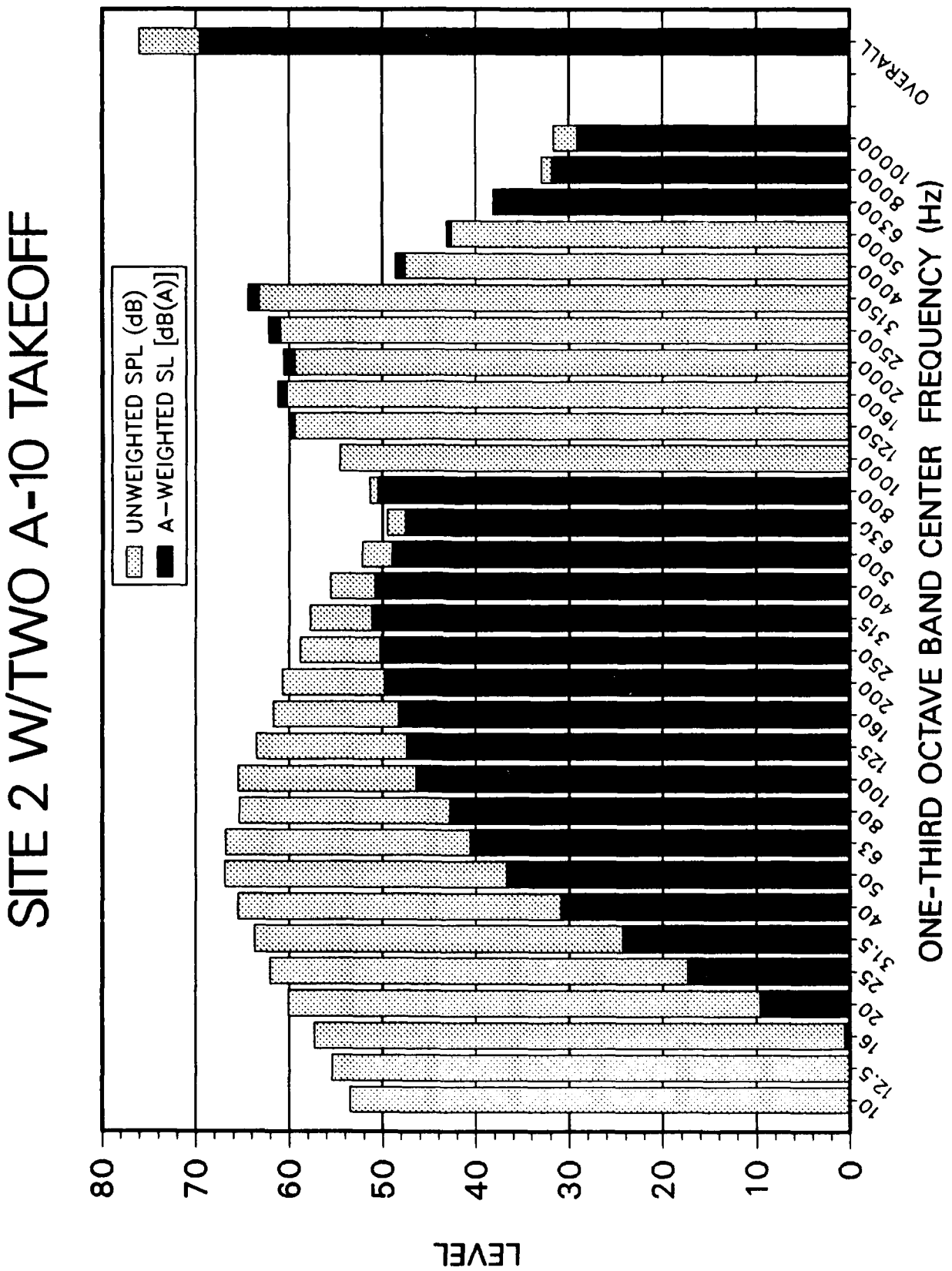
SITE 2 W/TWO A-10 TAKEOFF

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	53.5		0		35.8	
12.5	55.4		0		41.1	
16	57.3	62.8	0.6	10.5	46.1	53
20	60.1		9.6		51.6	
25	62.1		17.4		55.9	
31.5	63.7	68.8	24.3	31.9	59.3	64.8
40	65.5		30.9		62.5	
50	66.9		36.7		64.9	
63	66.8	71.2	40.6	45.5	65.5	69.8
80	65.3		42.8		64.5	
100	65.5		46.4		65	
125	63.5	68.6	47.4	52.2	63.2	68.2
160	61.7		48.3		61.5	
200	60.7		49.8		60.6	
250	58.8	64	50.2	55.2	58.8	64
315	57.8		51.2		57.8	
400	55.6		50.8		55.6	
500	52.2	57.9	49	54.1	52.2	57.9
630	49.5		47.6		49.5	
800	51.3		50.5		51.3	
1,000	54.6	61.1	54.6	61.5	54.6	61.1
1,250	59.4		60		59.4	
1,600	60.2		61.2		60.2	
2,000	59.4	65	60.6	66.2	59.3	64.9
2,500	60.9		62.2		60.7	
3,150	63.2		64.4		62.9	
4,000	47.6	63.4	48.6	64.5	47.1	63
5,000	42.6		43.1		41.8	
6,300	38.1		38		36.8	
8,000	32.9	39.9	31.8	39.4	30.9	38.4
10,000	31.6		29.1		29.6	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 76 dB OASLA = 69.6 dB(A)

OASLC = 74.6 dB C-A = 5 dB


SITE 2 W/TWO A-10 TAKEOFF
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

SITE 2 BCKGND W/PROP AC TAKEOFF

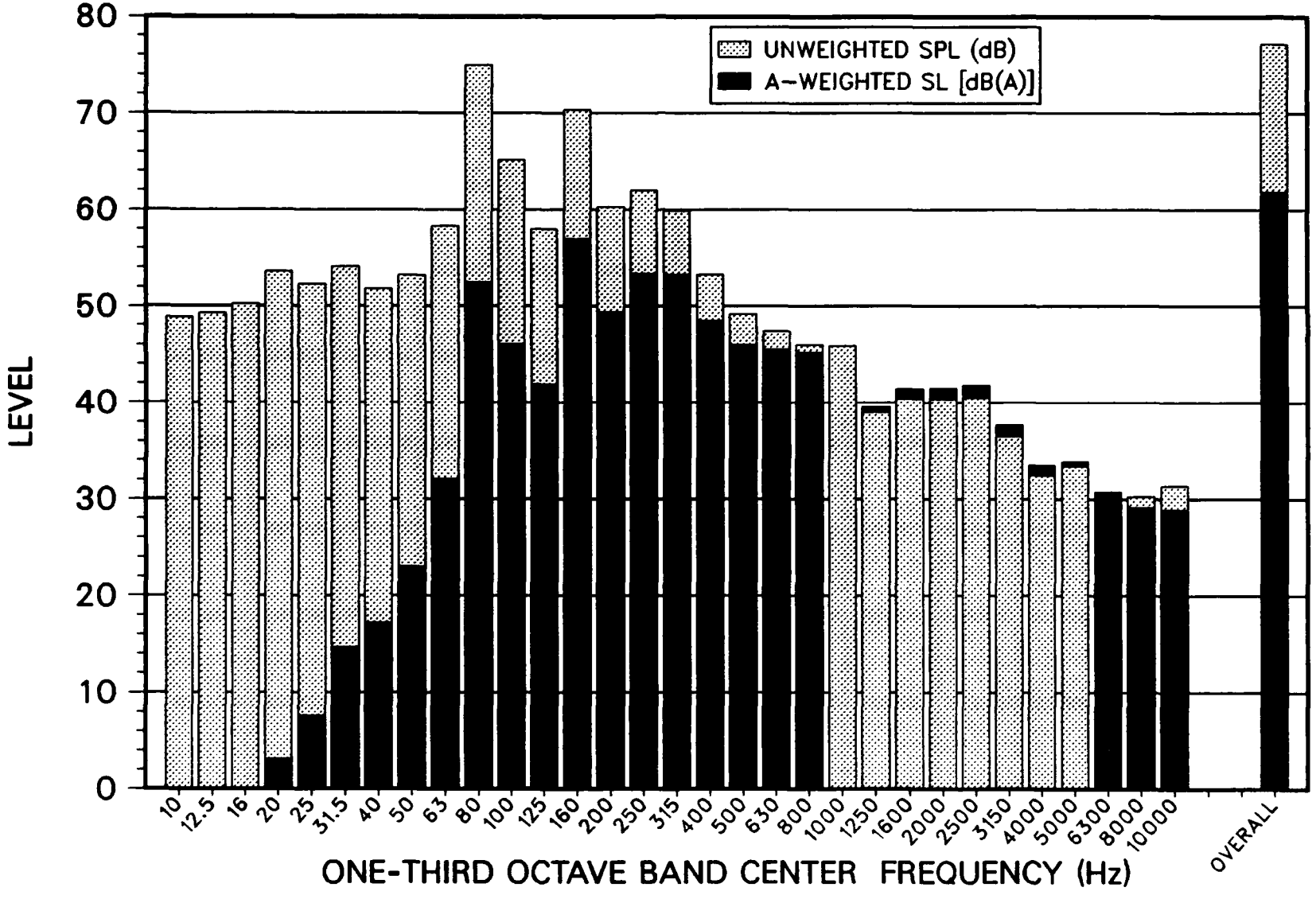
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	48.9		0		31.2	
12.5	49.3		0		35	
16	50.2	56.2	0	6.1	39	46.4
20	53.6		3.1		45.1	
25	52.3		7.6		46.1	
31.5	54.1	57.6	14.7	19.4	49.7	53.2
40	51.8		17.2		48.8	
50	53.2		23		51.2	
63	58.3	75.1	32.1	52.5	57	74.3
80	75		52.5		74.2	
100	65.2		46.1		64.7	
125	58	71.7	41.9	57.5	57.7	71.5
160	70.4		57		70.2	
200	60.3		49.4		60.2	
250	62	65.6	53.4	57.2	62	65.6
315	59.9		53.3		59.9	
400	53.3		48.5		53.3	
500	49.2	55.5	46	51.6	49.2	55.5
630	47.4		45.5		47.4	
800	46		45.2		46	
1,000	45.9	49.4	45.9	49.1	45.9	49.4
1,250	39		39.6		39	
1,600	40.4		41.4		40.4	
2,000	40.3	45.2	41.5	46.3	40.2	45.1
2,500	40.5		41.8		40.3	
3,150	36.5		37.7		36.2	
4,000	32.5	39.3	33.5	40.2	32	38.8
5,000	33.4		33.9		32.6	
6,300	30.7		30.6		29.4	
8,000	30.3	35.6	29.2	34.4	28.3	33.8
10,000	31.4		28.9		29.4	

••• OVERALL LEVELS (10 - 10000 Hz) •••

OASPL = 77.2 dB OASLA = 61.9 dB(A)

OASLC = 76.6 dB C-A = 14.7 dB

SITE 2 BCKGND W/PROP AC TAKEOFF



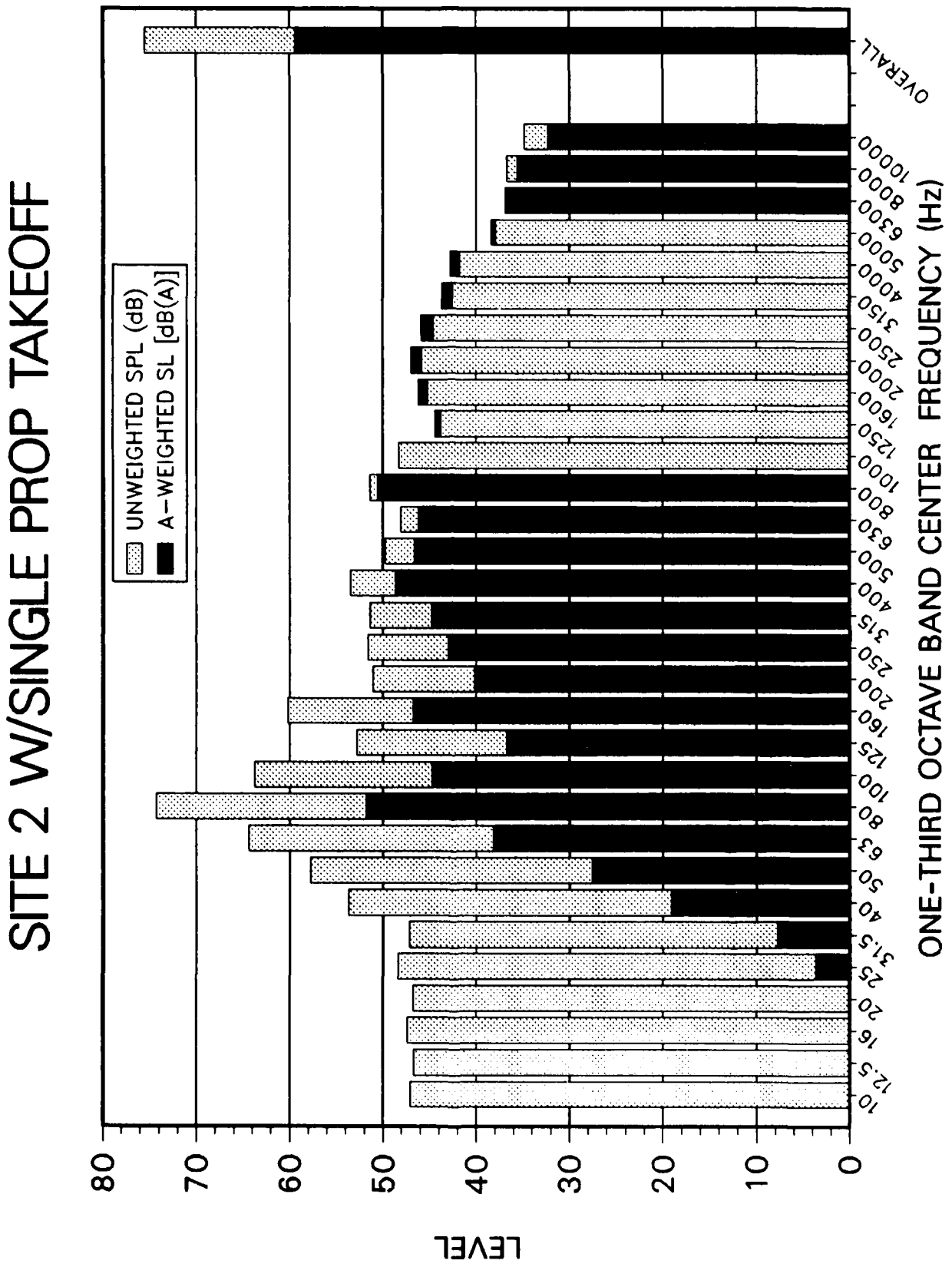
SITE 2 W/SINGLE PROP TAKEOFF

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	47.1		0		29.4	
12.5	46.7		0		32.4	
16	47.4	51.7	0	4.8	36.2	41
20	46.8		0		38.3	
25	48.4		3.7		42.2	
31.5	47.2	55.5	7.8	19.5	42.8	51.9
40	53.7		19.1		50.7	
50	57.8		27.6		55.8	
63	64.4	74.8	38.2	52	63.1	73.9
80	74.3		51.8		73.5	
100	63.8		44.7		63.3	
125	52.8	65.6	36.7	49.1	52.5	65.2
160	60.2		46.8		60	
200	51.1		40.2		51	
250	51.6	56.1	43	47.8	51.6	56.1
315	51.4		44.8		51.4	
400	53.5		48.7		53.5	
500	49.8	55.8	46.6	52.1	49.8	55.8
630	48.1		46.2		48.1	
800	51.4		50.6		51.4	
1,000	48.3	53.6	48.3	53.2	48.3	53.6
1,250	43.8		44.4		43.8	
1,600	45.2		46.2		45.2	
2,000	45.8	50	47	51.2	45.7	49.9
2,500	44.6		45.9		44.4	
3,150	42.5		43.7		42.2	
4,000	41.8	45.9	42.8	46.9	41.3	45.5
5,000	37.9		38.4		37.1	
6,300	36.9		36.8		35.6	
8,000	36.7	41	35.6	40	34.7	39.3
10,000	34.8		32.3		32.8	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 75.6 dB OASLA = 59.4 dB(A)

OASLC = 74.7 dB C-A = 15.3 dB


SITE 2 W/SINGLE PROP TAKEOFF
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

SITE 2 W/PRIVATE JET TAKEOFF

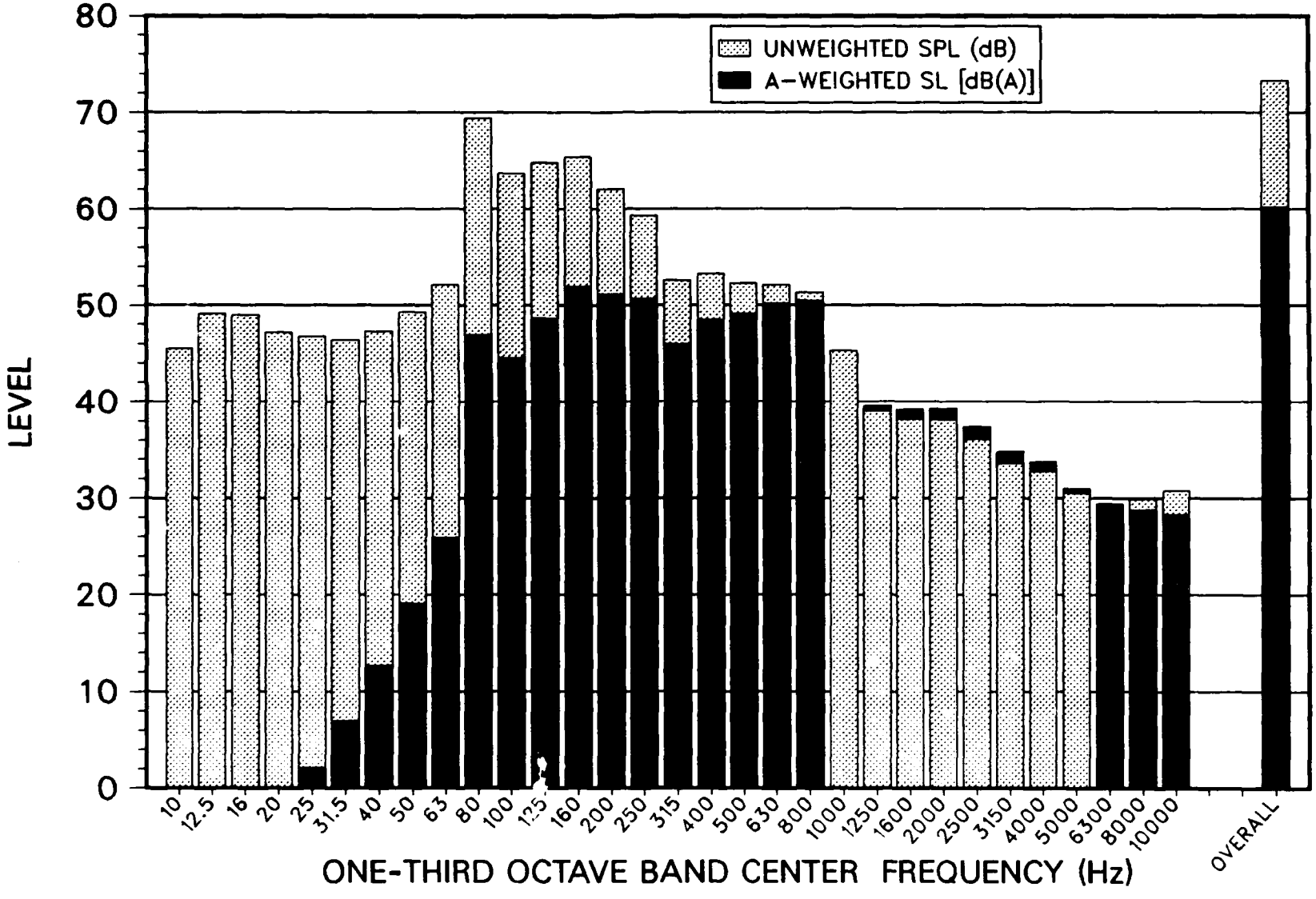
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	45.5		0		27.8	
12.5	49.1		0		34.8	
16	49	53.3	0	4.8	37.8	42.2
20	47.2		0		38.7	
25	46.8		2.1		40.6	
31.5	46.4	51.6	7	14	42	47.3
40	47.3		12.7		44.3	
50	49.3		19.1		47.3	
63	52.1	69.5	25.9	46.9	50.8	68.7
80	69.4		46.9		68.6	
100	63.7		44.6		63.2	
125	64.8	69.5	48.7	54.2	64.5	69.1
160	65.4		52		65.2	
200	62.1		51.2		62	
250	59.3	64.2	50.7	54.6	59.3	64.2
315	52.6		46		52.6	
400	53.3		48.5		53.3	
500	52.3	57.4	49.1	54.1	52.3	57.4
630	52.1		50.2		52.1	
800	51.3		50.5		51.3	
1,000	45.3	52.5	45.3	51.9	45.3	52.5
1,250	39		39.6		39	
1,600	38.2		39.2		38.2	
2,000	38.1	42.3	39.3	43.5	38	42.3
2,500	36.1		37.4		35.9	
3,150	33.6		34.8		33.3	
4,000	32.8	37.3	33.8	38.2	32.3	36.8
5,000	30.5		31		29.7	
6,300	29.4		29.3		28.1	
8,000	29.9	34.8	28.8	33.6	27.9	33.1
10,000	30.8		28.3		28.8	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 73.3 dB OASLA = 60.2 dB(A)

OASLC = 72.8 dB C-A = 12.6 dB

SITE 2 W/PRIVATE JET TAKEOFF



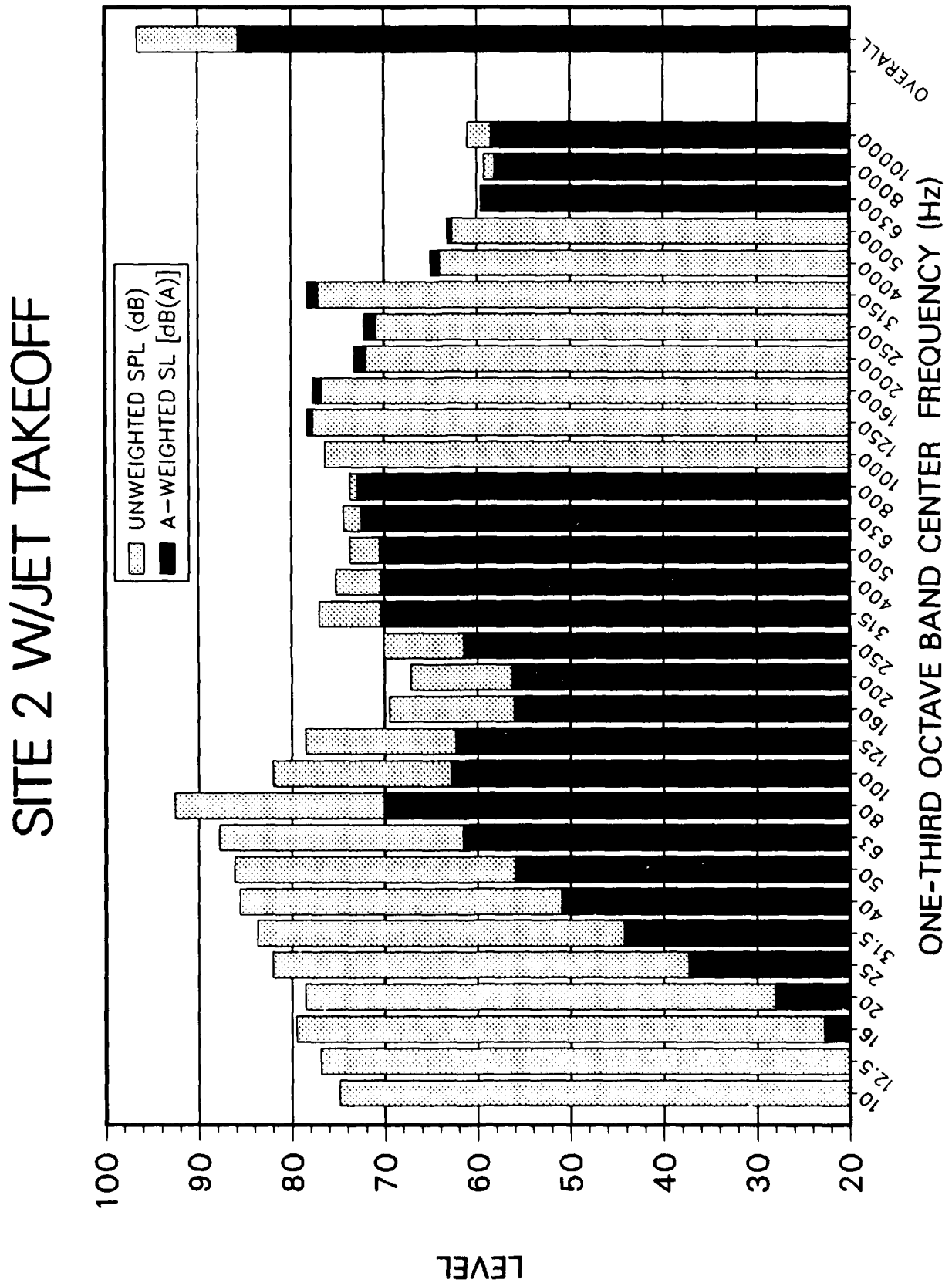
SITE 2 W/JET TAKEOFF

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	74.9		4.5		57.2	
12.5	76.9		13.5		62.6	
16	79.5	83.2	22.8	29.3	68.3	72.7
20	78.6		28.1		70.1	
	82.1		37.4		75.9	
31.5	83.7	88.8	44.3	52	79.3	84.9
40	85.6		51		82.6	
50	86.2		56		84.2	
63	87.8	94.5	61.6	70.8	86.5	93.5
80	92.6		70.1		91.8	
100	82		62.9		81.5	
125	78.5	83.8	62.4	66.1	78.2	83.3
160	69.5		56.1		69.3	
200	67.2		56.3		67.1	
250	70.1	78.2	61.5	71.1	70.1	78.2
315	77		70.4		77	
400	75.2		70.4		75.2	
500	73.7	79.2	70.5	76	73.7	79.2
630	74.4		72.5		74.4	
800	73.7		72.9		73.7	
1,000	76.4	81	76.4	81.2	76.4	81
1,250	77.7		78.3		77.7	
1,600	76.7		77.7		76.7	
2,000	72	78.7	73.2	79.8	71.9	78.7
2,500	70.9		72.2		70.7	
3,150	77.1		78.3		76.8	
4,000	64	77.5	65	78.6	63.5	77.1
5,000	62.7		63.2		61.9	
6,300	59.6		59.5		58.3	
8,000	59.2	64.8	58.1	63.5	57.2	63
10,000	61		58.5		59	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 96.5 dB OASLA = 85.7 dB(A)

OASLC = 95 dB C-A = 9.3 dB


SITE 2 W/JET TAKEOFF
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
100
90
80
70
60
50
40
30
20
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
OVERALL
10000
8000
6300
5000
4000
3150
2500
2000
1600
1250
1000
800
630
500
400
315
250
200
160
125
100
80
63
50
40
31.5
25
20
16
12.5
10

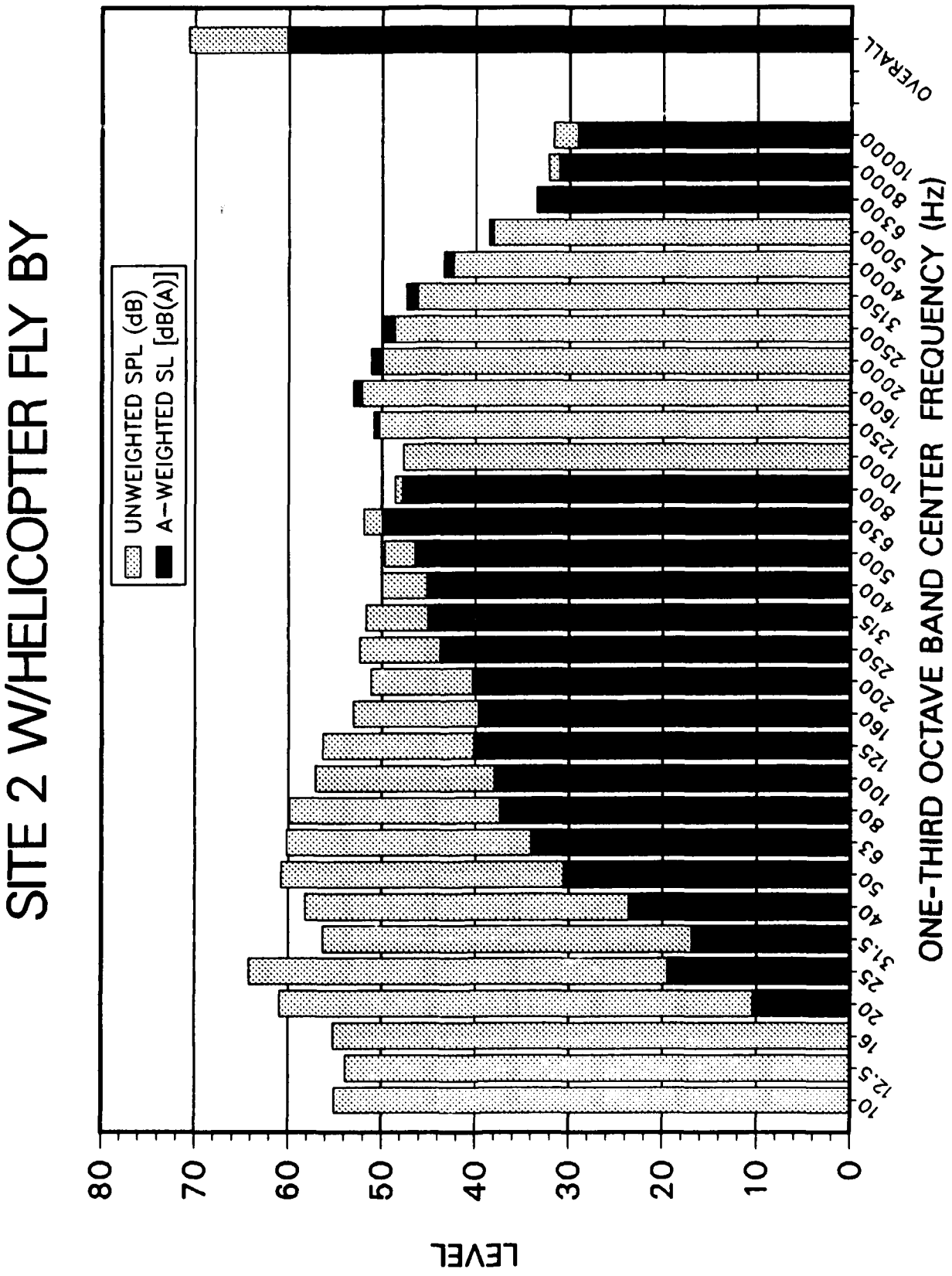
SITE 2 W/HELICOPTER FLY BY

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	55.1		0		37.4	
12.5	53.9		0		39.6	
16	55.2	62.6	0	11.1	44	53.2
20	60.9		10.4		52.4	
25	64.2		19.5		58	
31.5	56.3	65.7	16.9	25.6	51.9	60.5
40	58.2		23.6		55.2	
50	60.8		30.6		58.8	
63	60.2	65.1	34	39.6	58.9	63.7
80	59.9		37.4		59.1	
100	57.1		38		56.6	
125	56.3	60.6	40.2	44.2	56	60.2
160	53.1		39.7		52.9	
200	51.2		40.3		51.1	
250	52.4	56.6	43.8	48.3	52.4	56.5
315	51.7		45.1		51.7	
400	50		45.2		50	
500	49.7	55.4	46.5	52.5	49.7	55.4
630	51.9		50		51.9	
800	48.6		47.8		48.6	
1,000	47.7	53.8	47.7	53.8	47.7	53.8
1,250	50.3		50.9		50.3	
1,600	52.1		53.1		52.1	
2,000	50	55.3	51.2	56.4	49.9	55.2
2,500	48.7		50		48.5	
3,150	46.2		47.4		45.9	
4,000	42.4	48.2	43.4	49.2	41.9	47.8
5,000	38.1		38.6		37.3	
6,300	33.5		33.4		32.2	
8,000	32.2	37.3	31.1	36.3	30.2	35.6
10,000	31.7		29.2		29.7	

***** OVERALL LEVELS (10 - 10000 Hz) *****

OASPL = 70.7 dB OASLA = 60.2 dB(A)

OASLC = 67.9 dB C-A = 7.7 dB


SITE 2 W/HELICOPTER FLY BY
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
0
10
20
30
40
50
60
70
80
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

SITE 2 BKGND W/WAVES AGAINST SHORE

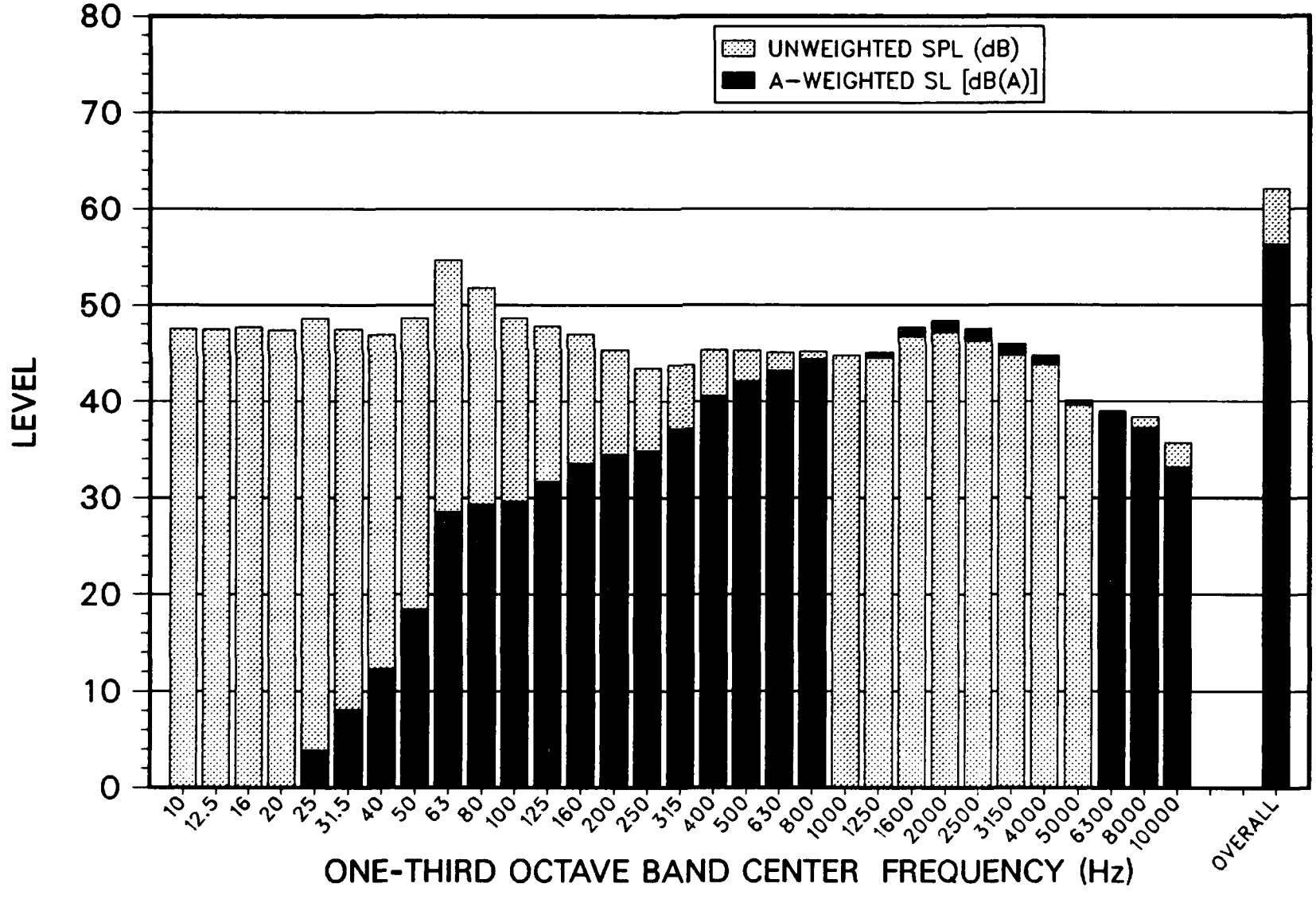
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	47.6		0		29.9	
12.5	47.5		0		33.2	
16	47.7	52.3	0	4.8	36.5	41.6
20	47.4		0		38.9	
25	48.6		3.9		42.4	
31.5	47.5	52.5	8.1	14.1	43.1	47.9
40	46.9		12.3		43.9	
50	48.7		18.5		46.7	
63	54.7	57.2	28.5	32.1	53.4	55.9
80	51.8		29.3		51	
100	48.7		29.6		48.2	
125	47.8	52.7	31.7	36.7	47.5	52.3
160	47		33.6		46.8	
200	45.4		34.5		45.3	
250	43.5	49.1	34.9	40.5	43.5	49
315	43.8		37.2		43.8	
400	45.4		40.6		45.4	
500	45.3	50	42.1	46.9	45.3	50
630	45.1		43.2		45.1	
800	45.2		44.4		45.2	
1,000	44.8	49.6	44.8	49.5	44.8	49.6
1,250	44.5		45.1		44.5	
1,600	46.7		47.7		46.7	
2,000	47.2	51.5	48.4	52.7	47.1	51.4
2,500	46.3		47.6		46.1	
3,150	44.8		46		44.5	
4,000	43.8	48	44.8	49	43.3	47.6
5,000	39.6		40.1		38.8	
6,300	39		38.9		37.7	
8,000	38.4	42.7	37.3	41.8	36.4	41
10,000	35.7		33.2		33.7	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 62.1 dB OASLA = 56.4 dB(A)

OASLC = 60.5 dB C-A = 4.1 dB

SITE 2 BKGND W/WAVES AGAINST SHORE



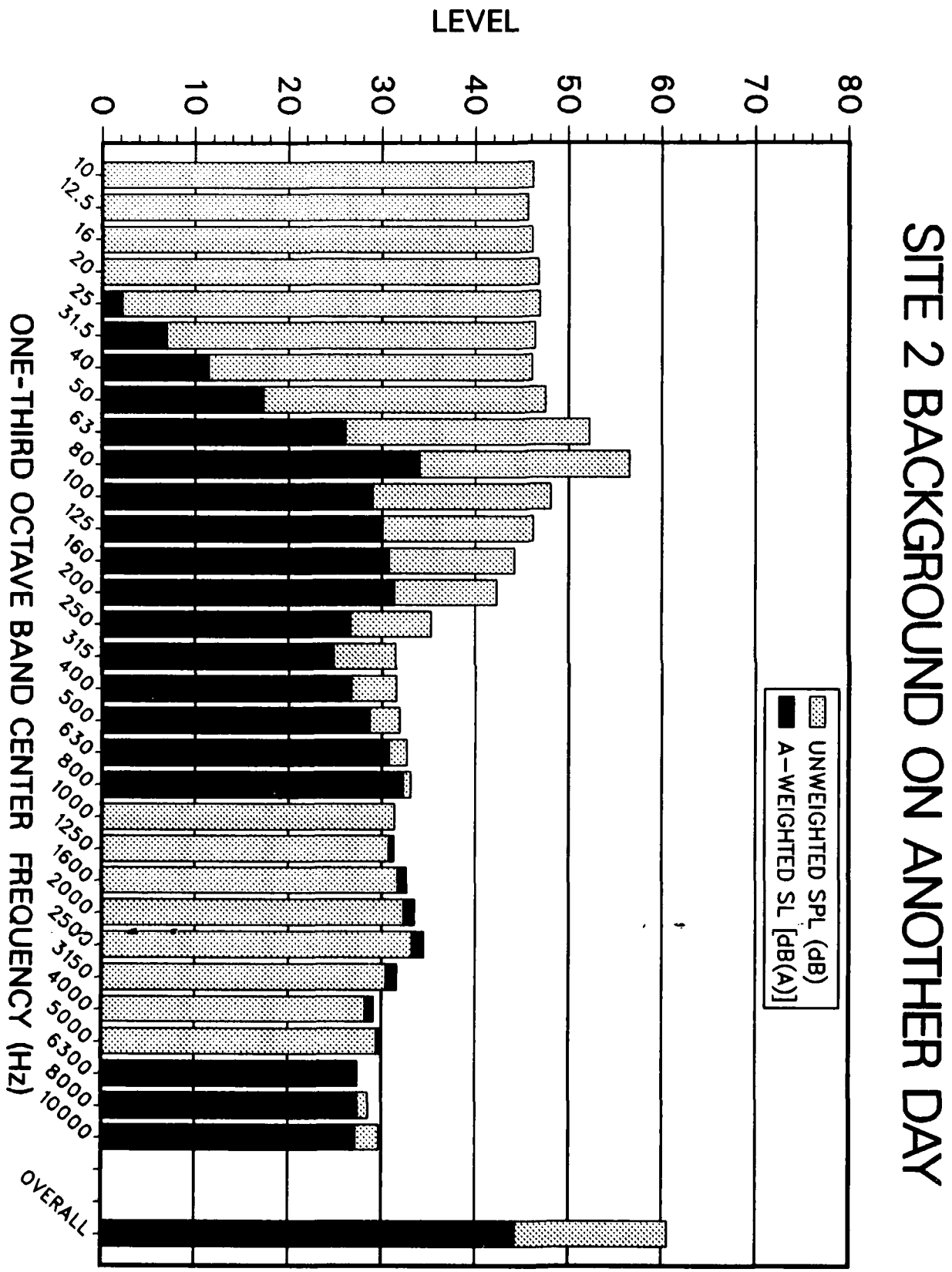
SITE 2 BACKGROUND ON ANOTHER DAY

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	46.2		0		28.5	
12.5	45.7		0		31.4	
16	46.1	51	0	4.8	34.9	40.5
20	46.8		0		38.3	
25	46.9		2.2		40.7	
31.5	46.4	51.3	7	13.2	42	46.8
40	46.1		11.5		43.1	
50	47.6		17.4		45.6	
63	52.3	58.3	26.1	34.7	51	57.3
80	56.5		34		55.7	
100	48.1		29		47.6	
125	46.2	51.2	30.1	34.8	45.9	50.8
160	44.2		30.8		44	
200	42.3		31.4		42.2	
250	35.3	43.4	26.7	33.3	35.3	43.3
315	31.5		24.8		31.5	
400	31.5		26.7		31.5	
500	31.9	36.8	28.7	33.8	31.9	36.8
630	32.7		30.8		32.7	
800	33.1		32.3		33.1	
1,000	31.4	36.6	31.4	36.5	31.4	36.6
1,250	30.7		31.3		30.7	
1,600	31.7		32.7		31.7	
2,000	32.3	[illegible]	33.[illegible]	38.4	32.2	37.1
2,500	33.2		34.5		33	
3,150	30.4		31.6		30.1	
4,000	28.2	34.2	29.2	35.1	27.7	33.7
5,000	29.4		29.9		28.6	
6,300	27.4		27.3		26.1	
8,000	28.5	33.4	27.4	32.1	26.5	31.6
10,000	29.7		27.2		27.7	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 60.6 dB OASLA = 44.3 dB(A)

OASLC = 58.8 dB C-A = 14.5 dB


SITE 2 BACKGROUND ON ANOTHER DAY
LEVEL
0
10
20
30
40
50
60
70
80
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL

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APPENDIX G

Dauphin II

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27 JUN 89

INTERIOR NOISE MEASUREMENTS
HR 36 SA 365N1
DAUPHIN II

SLOW RMS RANDOM

COPILOT

Frequency (Hz)	SPL A-weighted	SPL C-weighted	SPL Linear
31.5	65	102	108
63	72	98	99
125	72	94	95
250	84	93	93
500	84	88	88
1000	84	84	83
2000	81	80	80
4000	74	72	72
8000	76	74	79
16000	75	72	77
OVERALL	90	101	104

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APPENDIX H

KO Building Exposure

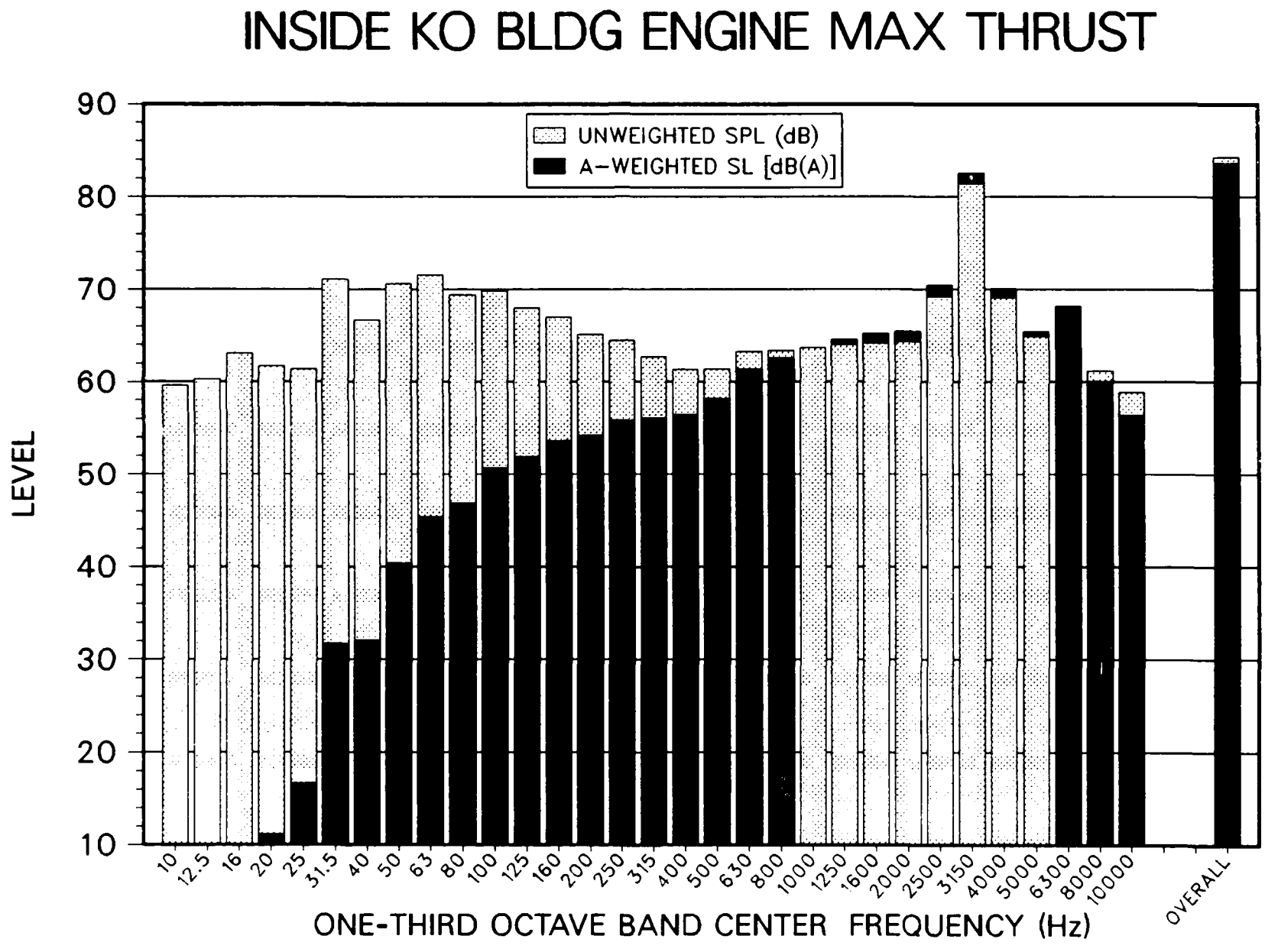
INSIDE KO BLDG ENGINE MAX THRUST

FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	59.6		0		41.9	
12.5	60.3		0		46	
16	63.1	66.6	6.4	12.7	51.9	56.1
20	61.7		11.2		53.2	
25	61.4		16.7		55.2	
31.5	71.1	72.8	31.7	35	66.7	68.7
40	66.7		32.1		63.7	
50	70.6		40.4		68.6	
63	71.6	75.4	45.4	49.8	70.3	74
80	69.4		46.9		68.6	
100	69.8		50.7		69.3	
125	68	73.2	51.9	57	67.7	72.8
160	67		53.6		66.8	
200	65.1		54.2		65	
250	64.5	69	55.9	60.3	64.5	68.9
315	62.7		56.1		62.7	
400	61.3		56.5		61.3	
500	61.4	66.9	58.2	64	61.4	66.9
630	63.3		61.4		63.3	
800	63.4		62.6		63.4	
1,000	63.7	68.5	63.7	68.5	63.7	68.5
1,250	64		64.6		64	
1,600	64.2		65.2		64.2	
2,000	64.3	71.3	65.5	72.6	64.2	71.2
2,500	69.2		70.5		69	
3,150	81.4		82.6		81.1	
4,000	69.1	81.7	70.1	82.9	68.6	81.4
5,000	64.9		65.4		64.1	
6,300	68.2		68.1		66.9	
8,000	61.2	69.4	60.1	69	59.2	67.9
10,000	58.9		56.4		56.9	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 84.3 dB OASLA = 83.7 dB(A)

OASLC = 83.6 dB C-A = -.1 dB


INSIDE KO BLDG ENGINE MAX THRUST
UNWEIGHTED SPL (dB)
A-WEIGHTED SL [dB(A)]
LEVEL
90
80
70
60
50
40
30
20
10
10
12.5
16
20
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
OVERALL
ONE-THIRD OCTAVE BAND CENTER FREQUENCY (Hz)

OUTSIDE KO BLDG ENG MAX THRUST

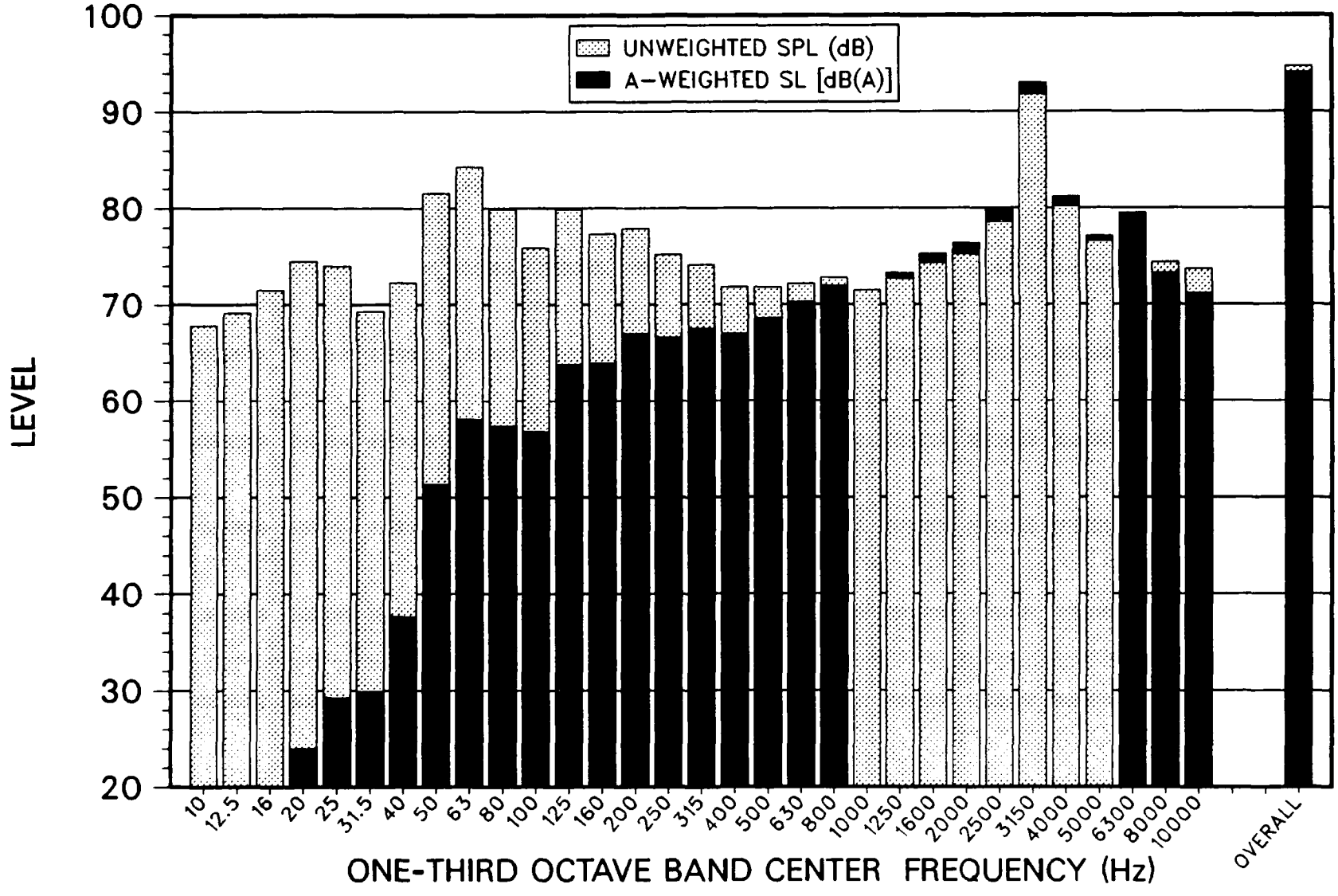
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	67.8		0		50.1	
12.5	69.1		5.7		54.8	
16	71.5	77	14.8	24.6	60.3	67.3
20	74.5		24		66	
25	74		29.3		67.8	
31.5	69.3	77	29.9	38.9	64.9	72.5
40	72.3		37.7		69.3	
50	81.6		51.4		79.6	
63	84.3	87.1	58.1	61.2	83	85.7
80	79.9		57.4		79.1	
100	75.9		56.8		75.4	
125	79.9	82.8	63.8	67.3	79.6	82.5
160	77.3		63.9		77.1	
200	77.9		67		77.8	
250	75.2	80.8	66.6	71.8	75.2	80.8
315	74.1		67.5		74.1	
400	71.8		67		71.8	
500	71.8	76.7	68.6	73.6	71.8	76.7
630	72.2		70.3		72.2	
800	72.8		72		72.8	
1,000	71.5	77.1	71.5	77.1	71.5	77.1
1,250	72.7		73.3		72.7	
1,600	74.3		75.3		74.3	
2,000	75.2	81.2	76.4	82.4	75.1	81.1
2,500	78.6		79.9		78.4	
3,150	91.8		93		91.5	
4,000	80.2	92.2	81.2	93.4	79.7	91.9
5,000	76.6		77.1		75.8	
6,300	79.5		79.4		78.2	
8,000	74.4	81.5	73.3	80.9	72.4	79.9
10,000	73.7		71.2		71.7	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 94.7 dB OASLA = 94.1 dB(A)

OASLC = 94.1 dB C-A = 0 dB

OUTSIDE KO BLDG ENG MAX THRUST



CENTER OF C-130 PAD

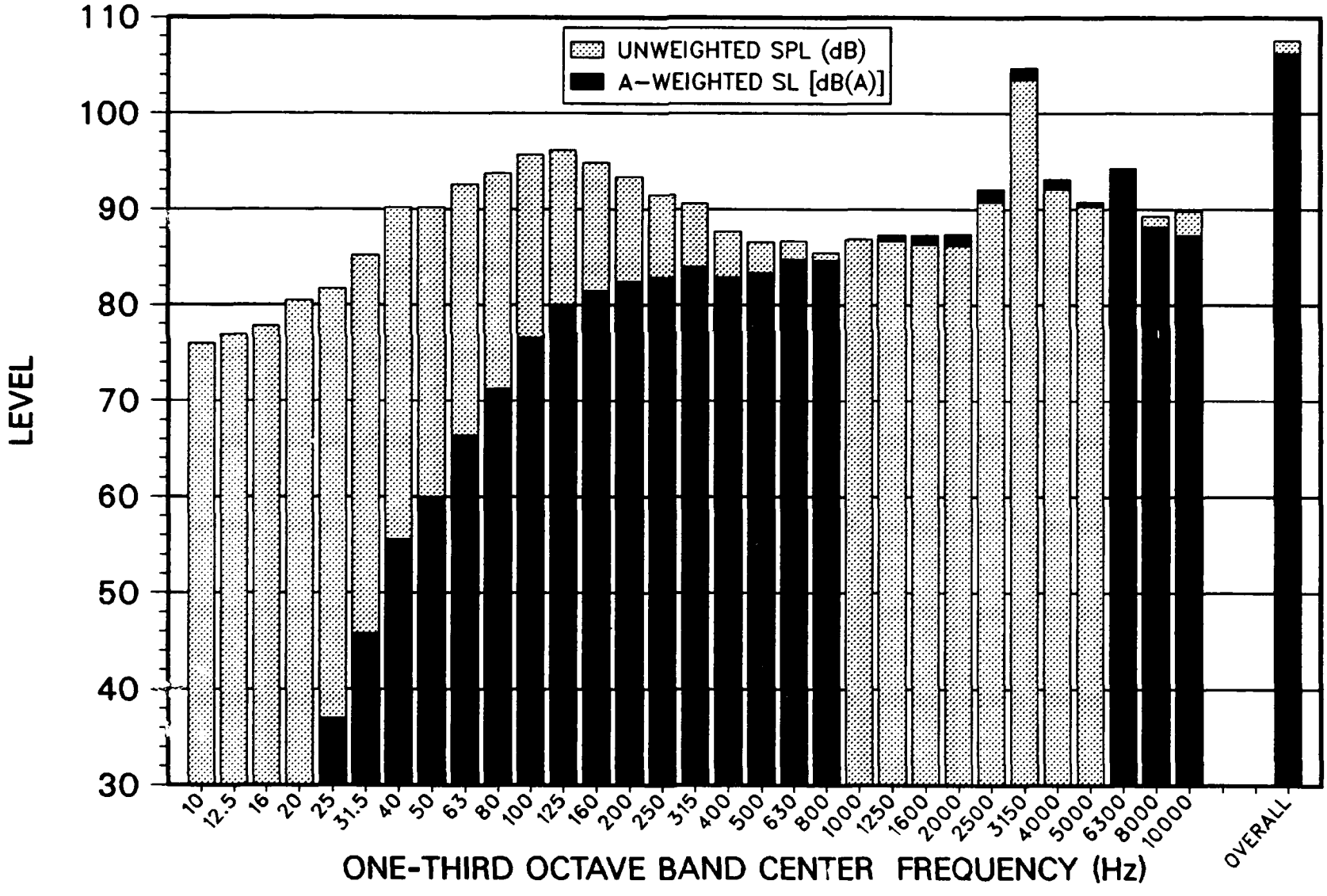
FREQ (Hz)	SOUND PRESSURE LEVEL (dB)	OCTAVE BAND SPL (dB)	A-WEIGHTED SOUND LEVEL [dB(A)]	A-WEIGHTED OCTAVE BAND SL [dB(A)]	C-WEIGHTED SOUND LEVEL [dB(C)]	C-WEIGHTED OCTAVE BAND SL [dB(C)]
10	76		5.6		58.3	
12.5	76.9		13.5		62.6	
16	77.8	83.5	21.1	30.6	66.6	73.5
20	80.5		30		72	
25	81.7		37		75.5	
31.5	85.2	91.8	45.8	56.1	80.8	88.3
40	90.2		55.6		87.2	
50	90.2		60		88.2	
63	92.6	97.2	66.4	72.8	91.3	96
80	93.8		71.3		93	
100	95.7		76.6		95.2	
125	96.2	100.4	80.1	84.6	95.9	100.1
160	94.9		81.5		94.7	
200	93.4		82.5		93.3	
250	91.5	96.8	82.9	88	91.5	96.7
315	90.6		84		90.6	
400	87.7		82.9		87.7	
500	86.6	91.8	83.4	88.5	86.6	91.8
630	86.7		84.8		86.7	
800	85.5		84.7		85.5	
1,000	86.9	91.2	86.9	91.2	86.9	91.2
1,250	86.7		87.3		86.7	
1,600	86.3		87.3		86.3	
2,000	86.2	93.1	87.4	94.3	86.1	93
2,500	90.8		92.1		90.6	
3,150	103.5		104.7		103.2	
4,000	92.1	104	93.1	105.2	91.6	103.7
5,000	90.3		90.8		89.5	
6,300	94.3		94.2		93	
8,000	89.3	96.5	88.2	95.8	87.3	95
10,000	89.8		87.3		87.8	

*** OVERALL LEVELS (10 - 10000 Hz) ***

OASPL = 107.6 dB OASLA = 106.3 dB(A)

CASLC = 107.1 dB C-A = .8 dB

CENTER OF C-130 PAD



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APPENDIX I

Recommended Fixes

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Recomended Barrier Fixes

1. Many different kinds of materials and designs can be used to remedy the shortcomings in the barriers. It is up to the base to determine the most appropriate action. This action would include the amount of work to be accomplished, material selection and engineering details. The following paragraphs are only suggestions and details will have to be worked out by the base. The base can call AFOEHL/EHI Noise Hazards Function to discuss the remedies.

2. All the design remedies must be able to withstand local weather conditions and the materials must not expand or contract to the extent the barriers are damaged.

3. The noise path through the airgaps between all four containers must be blocked. Blocking the noise path could be done several ways. Looking at the receiver side of the barrier, fill the gaps with attenuating material and enclose the material so it does not escape. Almost any material will attenuate the noise as long as it does not have or leave airgaps. The vertical gap between the two sets of two stacked barriers could be filled in with sand, dirt or any other material. The narrow two to three inch hortizontal gap between the stacked barriers could be filled with a blow in type of material. Another method could be to use a multi-purpose barrier/absorber combination. This material, at least twelve inches larger than the gap size, would be placed on the receiver side of the barrier because the absortive side of the material must be faced toward the source. The final application would look something like the sheet metal on the source side.

4. The barriers are vibrating, and stiffening and/or damping must be accomplished to eliminate some of the vibration. The barriers can be stiffened using I beams in an X pattern (see Figure I.1). Weld the I beams to points on the shipping container frames and also to the sheet metal side surfaces of the containers to prevent vibration. Spray vibration damping paint on the entire source side of the barrier including the I beams.

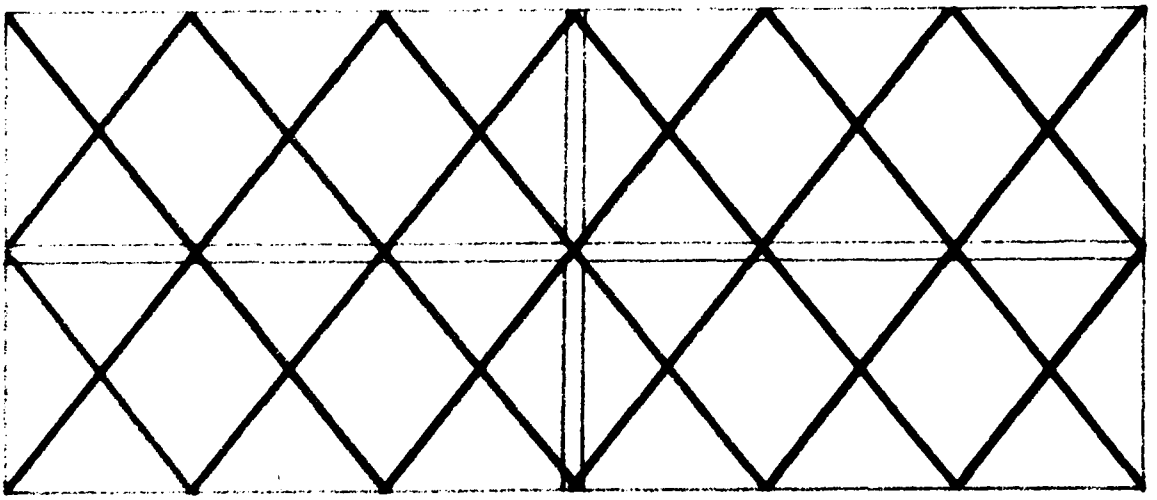

Figure I.1: I Beam Design to Stiffen Barriers

APPENDIX J

Glossary

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GLOSSARY OF TERMS

Average Day-Night Sound Level [DNL]: Sound level used to determine community noise. A 24 hour A-weighted equivalent sound level, with a 10 dB penalty applied to the nighttime levels from 2200 to 0700 hours.

** LDN= DNL= Ldn: Ldn is used in the equation.

Ldn Formula:

$$Ldn = 10 \log 1/24 \left[15X10^{(Ld/10)} + 9X10^{(Ln+10/10)} \right]$$

Ld: Daytime equivalent A-weighted sound level between the hours of 0700 and 2200.

Ln: Nighttime equivalent A-weighted sound level between the hours of 2200 and 0700.

A-Weighted Sound Level [dB(A)]: The ear does not respond equally to sounds of all frequencies. The ear is less efficient at low and high frequencies than it is at mid-range or speech range frequencies. In order to obtain a single number representing the sound pressure level of a noise containing a wide range of frequencies in a manner approximating the response of the ear, it is necessary to reduce or weight, the effects of the low and high frequencies relative to the mid-range frequencies. Therefore, the low and high frequencies are de-emphasized with A-weighting.

C-Weighted Sound Level [dB(C)]: The C-weighting scale weights the audible spectrum with more emphasis on the low frequencies than the A-weighting scale.

*Exceedance Levels [Ln(x.x%)]: The noise levels equaled or exceeded x.x% of the time.

Ln(1.0%): Peak noise level- Noise levels exceeded 1% of the time.

Ln(10.0%): Intrusive noise level- Noise levels exceeded 10% of the time.

Ln(50.0%): Median noise level- Noise levels exceeded 50% of the time.

Ln(90.0%): Background ambient noise level- Noise levels exceeded 90% of the time.

Overall Sound Pressure Levels (OASPL):

Overall Sound Levels A-weighted values (OASLA):

Sound Exposure Level (SEL): The A-weighted sound level measurement of a single noise event integrated over the duration of the noise event (referred to a reference time of one second). In other words, the event is equivalent to a level of a signal of one second duration.

* Definitions for Metrosonics db-310 Sound Analyzers

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